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Annual Report

City Engineer

Springfield, Massachusetts



Statute 3

For the Year 1902



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CITY OF SPRINGFIELD
MASSACHUSETTS

REPORT

OF

CITY ENGINEER

1902

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REPORT

OF THE

CITY ENGINEER.

CITY OF SPRINGFIELD, MASS., December 29, 1902.
To the City Council.

The report of the operations of the Engineering Department for the fiscal year ending December 10, 1902, is herewith respectfully submitted.

FINANCIAL STATEMENT.

RECEIPTS.

Annual appropriation for the year 1902,	\$10,000 00	
Transfer from contingent account,	560 00	
Receipts from other city departments,	1,808 06	
	-----	\$12,368 06

EXPENDITURES.

Salaries of City Engineer and assistants,	\$10,314 22	
Office rent, heating and lighting,	514 52	
Drawing materials, stationery and general supplies,	632 31	
Car fares, telephone and general office expenses,	848 27	
	-----	12,309 32
Balance unexpended,		\$58 74

DESCRIPTION OF EXPENDITURES.

ENGINEERING DEPARTMENT.

For all services performed on account of matters referred to the Board of Public Works by the City Council, relating to the laying out or alteration of streets, sidewalks, sewers, and

parks; surveys and levels for plans and profiles, estimates of cost, releases from damages, reports to the City Council, and general correspondence relating to the matter referred to the Board, and all clerical work performed relating to public hearings and all meetings of the Board: the measurements and assignment of house numbers, work upon house number books and records and making new plans; furnishing street lines and grades to individuals for buildings, grading, fencing, and sidewalk construction; survey, estimates, and all general services performed for the various committees of the City Council: general map, plan, and profile drawing of streets, sewers, and public property for office records and for future reference: measurement and recording of all sewer connections for house drains, the inspection of all sewers laid by private individuals in streets not public, examination and testing of material for same, and furnishing lines and grade; preparation of plans for the City Solicitor's use and attendance at court; making plans, estimating cost and attendance at hearings given on account of grade crossing abolition at the South End bridge; indexing, photographing, and blue-printing, examination of deed records, setting of street monuments, and all other services not charged to other city departments, the sum of \$8,506.16.

HIGHWAY DEPARTMENT.

For all work performed on account of and charged to the street work appropriation; estimates and plans, lines and grades, inspection of contract work, final measurements and estimates, and all other incidental work, the sum of \$565.60.

SIDEWALK AND CURBING DEPARTMENT.

For all work performed for the general sidewalk and curbing appropriation: lines and grades for laying out and construction, measurements for assessments, and all work incidental thereto, the sum of \$620.47.

SEWER DEPARTMENT.

For all services performed on account of the general sewer appropriation ; plans, estimates, laying out of work and general supervision of construction details, monthly and final estimates and certificates of work performed by contract, and all other incidental work, the sum of \$425.31.

FIRE DEPARTMENT.

For all work performed at the request of the Fire Commissioners, giving lines and grade for the Armory street engine house, the sum of \$1.37.

WATER DEPARTMENT.

For all work performed for the Water Department, work on plans showing location of water pipes, hydrants, gates, etc., and locating property line at the Van Horn Reservoir, the sum of \$103.12.

SCHOOL DEPARTMENT.

For all work performed at the Glenwood School, survey of lot, setting batter boards, and taking cross-section levels, the sum of \$16.87.

For all work performed at the Tapley School, giving elevations to architect, the sum of \$1.92.

For all work performed at the Chestnut Street School, giving elevations on walls, etc., the sum of \$1.28.

PARK DEPARTMENT.

For all work performed for the Park Department, setting stakes for sidewalks and curbing, etc., the sum of \$31.70.

SPRINGFIELD STREET RAILWAY CO.

For all work performed for the Springfield Street Railway Company, establishing lines and grades for relaying tracks, the sum of \$35.50.

THE WORK OF THE YEAR IN GENERAL.

The work of the department for the year has been somewhat unlike that of more recent years. No contract work of magnitude has been performed in the departments of Sewerage and Paving, and in consequence some of the time usually devoted to contract and specification drawing and inspection has been devoted to other lines of work.

There is always a considerable amount of miscellaneous work that is postponed from year to year with the expectation that a time will present itself that will enable such work to be taken in hand. There has been more opportunity for such duties during the present year than has been afforded for some time. In consequence some time has been expended in establishing benches, or reference points for elevation, about the city, for use in establishing and laying out work on the ground involving sidewalk, curbing, and sewer grades. Careful lines of levels have been run through many different streets, and benches accurately established upon buildings, street monuments, and other permanent objects. It has been ascertained from the experience of recent years that many of the benches established in former years have been so disturbed by frost action and other agencies that they have become very unreliable. It often occurs that during the busy season in outdoor work these changes reveal themselves in such manner as to necessitate considerable expenditure of time and research in order to find out what benches may be safely used. This is often the case when there is considerable haste for work of different kinds to be laid out in order that workmen may proceed with the work, and it is such occasions that fully demonstrate that great saving of time and vexation of spirit may be effected by having a general system of bench elevations that can be quickly referred to and with a feeling of confidence in the results obtained from their use.

This work calls for much skill and care as well as the use of high grade instruments in order to secure proper results.

A card index has been employed for a few years devoted exclusively to this branch of the work, in which it is possible to exclude all undesirable matter, retaining that which is dependable and up to date.

A 17 inch dumpy leveling instrument was employed for this work, with inverting eyepiece and power of about 35 diameters, having also a level attached sufficiently sensitive to indicate five seconds in arc for 1-10 of an inch run of bubble. A special rod was used, made by W. & L. E. Gurley of Troy, N. Y., with special reference to this branch of work, made some ten years ago and retained for such special use. It is of the same pattern and construction as used in a line of precise levels between Boston, Mass., and Albany, N. Y.

CITY MAP.

The department has for many years felt the need of a more reliable general map of the city of which there is nothing in use that can be depended upon, especially in many portions of the city. The need of such a map is felt in all city departments as well as in general business.

The atlas last prepared by outside private enterprise is a great improvement over any previous work and illustrates the enterprise of a local firm of engineers and map publishers in furnishing the necessary capital and labor for the surveys and office work incidental to such work.

A thoroughly reliable map that can be depended upon in all parts can only be made by the expenditure of more time and means than has heretofore been devoted to such work.

Such a map should first be founded on an accurate triangulation of the city, making use as far as practicable of the previous triangulations conducted for the state, and the more recent town boundary survey by the state. Such triangulation is necessary in order to secure an accurate outline or framework. This having been secured the filling in of details will follow by the more usual surveying methods.

Many cities have secured such surveys based on prior triangulations and are able to furnish city departments reliable map information, and others, as well, who desire such information. In many instances maps made from such surveys have been sold to outside parties, thereby securing a revenue to cover in part the expense of the work.

The plans of city lots, surveys for which were begun in 1873 for use of the Assessors, have not progressed during recent years there having been no appropriation to cover the cost of such work. The latest appropriations made for the work amounting to but \$500.00 per annum, only small progress could be made.

The Assessors have so strongly felt the need of this work that they have been led to carry forward the work in some sections of the city with such crude methods and appliances as they may have in hand. They do not profess to be skilled in survey work or plan construction, but their results are far better than no plans at all.

It is strongly urged that the incoming city government consider the matter of making accurate surveys and plans for extending this work, and if possible provide the necessary funds for its further prosecution. Such plans are not only of service to the Assessors but would be of great assistance to the Engineering Department as well.

Some work was done late in the fall season in securing further surveys in the outskirts of the city and along town boundary lines that would aid in constructing a general city map.

An examination has also been made of portions of the city to see how far the recent town boundary line triangulation made by the state could be utilized in the proposed work.

The need of a new map of the city is so urgent that the department work is greatly interfered with by the lack of such information.

STREET WORK.

A large amount of time has been expended during the year upon street widenings and relocations connected with franchises granted the Street Railway Company for new lines or double tracking existing lines.

Owing to a departure from former customs the city agreed to perform all work of grading and hardening of roadways, as well as payment of land damages and other incidental expenses, the Street Railway Company providing for all track construction and hardening of roadways covered by tracking.

The work was begun early in the spring, and occupied the whole summer season, the last grading and hardening being performed in the late fall, and the widening of the Berkshire street bridge over the Boston and Albany railroad having been finished early in December.

Much time has been spent in the arrangement of preliminaries for these street alterations while the matters were in the hands of the Board of Public Works for investigation and report. Numerous hearings have been held, and a large amount of conferring with property owners has been done concerning the matter of land damages occasioned by these alterations.

As clerk of the Board of Public Works, the City Engineer finds that a great amount of detail must be performed to get these matters in suitable shape for the final action of the Board and the City Council, but the duties are such, involving as they do the consideration of plans and profiles and the results following from their adoption, that it quite naturally falls within the scope and general duty of the City Engineer.

BELMONT AVENUE WIDENING.

At about the time of the granting of the franchise for the single track location to East Longmeadow, a petition was presented to the City Council, and afterwards referred to the Board of Public Works, for the widening of Belmont avenue, and White street. The necessary hearings were given.

and a report made to the City Council early in the spring, the matter of land damages having been settled with some of the owners of property taken, and is still pending with some others.

The work of grading and graveling soon followed, the grading being but slight, not involving large cuts or fills.

WHITE STREET.

The Board of Public Works made recommendation and report upon the White street widening between Belmont avenue and Longmeadow line during the late winter season. This alteration involved the straightening at Dingle brook, and the making of a deep fill at the same point, amounting to about 14,000 cubic yards. It was also necessary to extend the stone culvert to upper side of the road, and to extend the same with two 24 inch pipe branches to the outside limits of earth slopes in order to receive the two branches which form the Dingle brook.

The material for the earth filling was fortunately obtained from adjoining property, thereby making a short haul.

The straightening constitutes a decided improvement appreciated by both the traveling public and the property owners in the vicinity. The grade of the street has been much improved by the filling in of the former hollow or depression in grade over the brook.

The general improvement of the roadway in White street between Allen and Orange streets was much needed. The condition of the street has for several years, or since the laying of a street railway track, been in a deplorable condition, but beyond remedy with ordinary earth or gravel materials. Owing to the narrow space on each side of the track the travel was so confined that the roadway was a slough in wet, muddy weather and badly rutted and rough in dry weather.

The Street Railway Company and the city having agreed concerning the cost of certain changes in consideration of a

franchise for a double track turnout, it was decided to pave the space covered by street railway tracks and eighteen inches outside with vitrified brick paving laid on a 6 inch concrete base and 1 inch sand cushion. This was done and the remaining roadway outside the paving macadamized.

A petition was introduced for the widening of the roadway and narrowing the space occupied by tree belts. This was referred to the Board of Public Works, who reported that the alteration was expedient and an order was passed by the City Council based thereon, making a roadway of 32 feet in width instead of 30 feet as heretofore provided.

The cost of this work, which includes paving, macadamizing, and curb resetting, was \$5,213.68.

The Board of Public Works have now under consideration the widening of White street from Orange street to Belmont avenue, an improvement that will doubtless be appreciated by the traveling public in the future; but little development having been done up to the present time the widening can be effected better than when extensive improvements have been made.

BERKSHIRE AND STATE STREETS.

The largest and most costly work performed on account of grading and widening for street railway construction was the work done in State and Berkshire streets. This section being over three miles in length, much preliminary work was required for the Board of Public Works' report, including estimates of land damages and cost of grading, also estimate of work at bridge over Boston and Albany railroad.

The completion of this work furnishes a very satisfactory avenue for public travel, the street having been widened from three to five rods. A 46 foot roadway has been constructed, which leaves outside the double tracking for street car service a very satisfactory roadway for the present needs.

A large amount of work was done in filling off into the

pond near to and westerly of Indian Orchard village. The bridge over the Boston and Albany railroad has been widened to 36 feet in the clear, the masonry having been extended on each side to permit the changes made to bridge structure.

Sidewalk widths and grade have also, been laid out and established in order that proper locations for placing shade trees might be determined.

A very decided improvement has been made in the relocation of State street over land owned by Silas Warner and Joseph Lacroix, eliminating the crook in the road at that point in a considerable measure. Considerable grading was done at this point in cutting down the high bank on Mr. Lacroix's land and filling the meadow westerly of the cemetery.

In the general work of carrying out the street improvements contemplated in connection with the street railway franchises of last year much more work has been done than was contemplated in the rough preliminary estimates furnished the Board of Aldermen at the time of granting the franchises, the first estimate having been made without detail plans or any knowledge of the future recommendation of the Board of Public Works. The relocation of State street was neither contemplated nor estimated on. Also in the Berkshire street laying out, as finally reported by the Board of Public Works, a much greater amount of grading was provided for than contemplated in the first estimate of cost.

WILBRAHAM ROAD.

In the construction of the new single track line through Wilbraham road to the "House of the Good Shepherd" no considerable amount of grading was necessary, the street having been worked to the present grade some years previous.

At the crossing of the Carlisle brook the track was laid in the location of the street proposed some time previous, but which, owing to various complications, has not been adopted up to the present time.

The cost of the various improvements above described was as follows : —

Belmont avenue, Garfield street to White street, grading, graveling, land damages, and incidentals,	\$12,540 48
White street, Belmont avenue to Longmeadow line, grading, graveling, land damages, and incidentals,	6,439 06
Berkshire street, State street to Chestnut street, I. O., grad- ing, graveling, land damages and widening, bridge and masonry at Boston & Albany R. R.,	24,391 89
Wilbraham road, State street to the " House of the Good Shepherd,"	702 71
State street, Benton street to Berkshire street, grading, macadamizing, and land damages,	10,795 92
Total cost,	\$54,870 06

The above cost covers all the ground that was contemplated in the estimate of the City Engineer furnished the Board of Aldermen and special franchise committee in December, 1901, and includes also the extra work done on State street near Mr. Lacroix's premises, the cost of which (grading and land damages) amounts to \$1,164.63.

PLAINFIELD STREET WIDENING.

The widening of Plainfield street from Main street to the Boston and Maine railroad, according to the order of the City Council of 1901, was begun early in the spring season and completed in midsummer. The street as widened is 66 feet wide with sidewalk and tree belt on the westerly side of 10 feet and a width of sidewalk on the east side of 7 feet, leaving a roadway 49 feet in width. The roadway has two street car tracks laid in the center with Metropolitan full grooved rails.

The roadway, including street car tracks, was paved with Syracuse vitrified brick laid on a 6 inch concrete base and a one inch sand cushion, the joints of the brick being filled with pitch; about 10,000 yards were laid at a cost of about \$2.50 per yard.

During the present year an order has passed for the widen-

ing across the Boston and Maine railroad in continuation north-
erly of the work done this year.

This will involve a considerable money expenditure in alter-
ations to the present bridge structure and masonry over the
Boston and Maine railroad.

In view of the manifest advantages to the Street Railway
Company from the widening, they should contribute to the cost
of this improvement.

The cost of the Plainfield street widening was as follows:

Paving 49 foot roadway, inlet basins, sidewalks and	
curbing,	\$25,467 51
Land damages,	13,701 00
Total cost,	<u>\$39,168 51</u>

LONG HILL STREET AND PECOUSIC AVENUE.

The petition for this alteration which covers Long Hill street
down the hill and in front of Mr. E. H. Barney's residence has
been jointly referred to the Board of Public Works and the
Board of Park Commissioners. Owing to various complica-
tions no report has been made on this matter. It involves the
consideration of many things and must necessarily involve con-
siderable cost as it comes under the head of heavy work. The
bridging of the valley across Pecousic brook involves also con-
siderable work.

SOUTH END BRIDGE GRADE CROSSING ABOLITION.

It would now appear that the long existing and dangerous
railroad grade crossing at the east end of the South End bridge
is to be abolished, the city and the New York, New Haven and
Hartford Railroad Company having entered into a general
agreement as to the plan to be employed.

The plan for the abolition of the grade crossing by construct-
ing two inclined roadways in South street has been abandoned

for the much better scheme of relocating South street easterly near the foot of the hill slope so that a short direct approach to the bridge is secured, involving about 250 feet of 4 per cent. grade, whereas the other plan included about *1,100 feet* of 4 per cent. grade.

Considerable time has been expended during the last two months in making plans and estimates for this work in order that the Grade Crossing Commission might have opportunity to consider the matter from all sides of the question.

It now appears likely that the Commission will make a finding upon the matter in a short time, plans for which are now being conjointly made by the city and the railroad company.

SEWERAGE.

The moneys expended for sewerage work during the year have been less than usual for more recent years. The orders of the City Council have been kept well in hand, and but a small amount of work remains to be performed that has been ordered by the City Council. The appropriation for sewers having been exhausted in the early fall season, but little work has been undertaken during the latter part of the season.

There is, however, opportunity for a very considerable further expenditure for extension work. Many existing sewers constructed years ago are found to be lacking in capacity, and must, in the near future, be relieved by the construction of auxiliary lines, or the enlargement of the sewers as at present constructed. Although attention is directed each year towards the reconstruction of the old cement pipe sewer system, and a large amount of work has been already performed under this head, there yet remains a larger amount of work to be done, and liberal amounts must be expended yearly for this work.

Many back floodings into cellars are found to be the result of obstructions in these old pipe sewers; the ingrowth of tree roots in time may cut off nearly or quite the entire capacity of the pipe.

Some sewers are found laid many years ago on such steep grades that the bottoms are nearly worn through. Such sewers as recently noticed are the sewers in Central street westerly of Maple street, and Worthington street between Kibbe avenue and Federal street.

MILL RIVER VALLEY INTERCEPTING SEWER.

No progress has been made towards the further extension of this sewer around the north shore of the Water Shops Pond since the completion of the work in midwinter on the Seymour and Newell contract. Owing to many difficulties encountered, this work, that was to have been finished in the fall season, was not completed until February.

The Board of Public Works instructed the City Engineer to secure the necessary rights of way from the end of the present work in Hickory street across private property, and around the north shore of Water Shops Pond for a distance of about one mile. The Board are also further expected to submit to the City Council a detailed report covering right of way, and the Engineering Department's estimate of the cost. The right of way has been secured from all parties except one, and the necessary agreements in writing fully executed.

It now appears that the preliminaries will all be provided for early in the winter so that contracts may be made for the work early in the spring season, or before if the City Council so decides, and the necessary money is provided.

A large section of country northerly and northeasterly of Water Shops Pond will be dependent on this sewer, and the purity of the ice supply in the pond will be more or less endangered until all sewage which is now discharging into the Gunn Square and Carlisle brooks is intercepted and taken into the intercepting sewer.

SUMNER AVENUE SEWER.

An order passed the City Council for the extension of the Sumner avenue sewer easterly from White street to provide for the new development in that section, but owing to the lateness of the season at the time the order was passed, and the insufficient appropriation, the sewer has not yet been constructed.

OUTLETS INTO CONNECTICUT RIVER.

The main sewers in Brightwood, in Wason and Rowland avenues, when constructed about ten years ago, were carried to the shore of the river and left without any bulkhead construction to protect the work against the action of the river, as the matter was at the time under consideration of the State Harbor and Land Commissioners of laying out and establishing a river line beyond which no structure should be erected. Since that time the Legislature, under recommendations of the Harbor and Land Commissioners, has established a line so that it is now known just how far we may encroach upon the river. As these outlets have for some time demanded attention a start was made in October and a new concrete masonry bulkhead constructed at the mouth of the Wason avenue sewer so that sewage flow from this sewer will now discharge into the water in the river rather than into the small cove basin that has received the flow since the construction of the sewer in 1891.

In order that a suitable foundation might be secured it was necessary to place sheet piling about the new structure ; this will also serve to protect the masonry bulkhead from any undermining action of the river.

It has not been considered expedient to attempt to carry the flow from this sewer by a submerged outlet laid under the bed of the river, out into the river, as the available head for forcing it out is so small.

The cost of the work was \$886.69.

ROWLAND AVENUE OUTLET.

It was intended to treat the Rowland avenue outlet in the same manner as that at Wason avenue, but as the moneys available were so limited it was postponed. The necessity for this work is, however, as great or greater than was the case with Wason avenue, and the work should be undertaken the coming summer as soon as the height of the river and the season will permit.

PLAINFIELD STREET SEWER.

The construction of this sewer as ordered by the City Council was commenced at Orchard street in the early summer and laid northerly to Newland street. The bottom was found to be very bad consisting of an unstable quicksand. The cost was so great that it was decided to suspend the work until later in the season in order that better conditions might be secured in case the season should be a dry one. The condition did not improve sufficiently to warrant the further prosecution of the work until the available moneys were exhausted. The work should be completed during the coming season.

DEPARTMENT EMPLOYEES.

The assistants employed during the year have varied in number according to the nature and quantity of work in hand. The regular force has been made up as follows:—

Principal assistant, Walter A. Brown.

Instrument men and draughtsmen, Herbert E. Flint, Charles A. L. Wright, Edward G. Martin, Howard O. Buck, Ernest F. Young.

Rodmen and draughtsmen, Charles J. Hancock, Harold T. Murphy.

City Engineer's clerk, stenographer, and typewriter, Miss Edith I. Gibbins.

There have also been temporarily employed for periods of varying duration, Messrs. Orrin F. Cooley, J. Beckwith, C. A. Tinker, R. W. Morse, L. M. Harwood, E. R. Clarke, J. D. Williams, and Harold C. Wright; most of the last named having been employed during the midsummer for periods varying from a few days to two or three months.

For the earnest co-operation of the assistants employed, and the courtesies extended by the various members of the City Council, with whom pleasant relations have been sustained, I desire to return thanks.

Respectfully submitted,

CHARLES M. SLOCUM,

City Engineer.

BOARD OF ALDERMEN, December 29, 1902.

Read, accepted, ordered printed, and sent down for concurrence.

E. A. NEWELL, *Clerk.*

COMMON COUNCIL, December 29, 1902.

Read and concurred.

H. S. GILBERT, *Clerk.*

Presented to the Mayor for approval, December 30, 1902.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, SPRINGFIELD, MASS., December 30, 1902.

Approved.

RALPH W. ELLIS, *Mayor.*

LENGTH AND AREA OF STREETS PAVED TO DECEMBER 10, 190

LOCATION.	Date of Laying.	Length in Feet.	Area in Sq. Yds.	Material.	Foundation.
Belmont av., 400' east of Woodside av. to Hall st.	1901	1,362	1,211	Catskill block	6" concrete base
Bridge st., Main to Dwight st.	1900	688	2,525	Rock asphalt	" "
Catharine st., State to Bay st.	1900	1,722	5,691	Vitrified brick	" "
Chestnut st., northerly from Lyman st.	1889	256	1,471	Granite blocks	Sand
" " B. & A. railroad to Linden st.	1892	1,640	5,235	" "	" "
" " Linden to Carew st.	1893	773	2,156	" "	" "
" " Lyman to Worthington st.	1895	472	1,673	" "	" "
" " Carew to Allendale st.	1900	1,015	3,432	Vitrified brick	6" concrete base
Court st., Main st., westerly	1897	317	1,277	Rock asphalt	" "
" " Court Square ave., easterly	1897		174	Vitrified brick	" "
" " Square ave., Court to Elm st.	1897	193	503	Rock asphalt	" "
" " " " " "	1897		330	Vitrified brick	" "
Dwight st., Lyman to State st.	1896	2,324	9,905	" "	" "
East Court st., Main to Market st.	1900	117	297	Rock asphalt	" "
Elm st., Main st., westerly	1897	343	949	" "	" "
" " " " to Court Square ave.	1897		330	Vitrified brick	" "
Fort st., Main to Water st.	1895	670	1,770	Granite blocks	Sand
Harrison ave., Main to Dwight st.	1896	586	2,247	Trinidad asph.	6" concrete base
Liberty st., Chestnut to Cass st.	1900	1,399	4,571	Vitrified brick	" "
" " Cass st. to Heywood ave.	1901	1,147	3,971	" "	" "
Lyman st., Main to Chestnut st.	1889	1,305	4,589	Granite blocks	Sand
Main st., Elm to Court st. (westerly side)	1887		432	" "	" "
" " Bridge to State st.	1888	1,550	5,857	" "	" "
" " " " Lyman st.	1889	787	3,065	" "	" "
" " Liberty to Cypress st.	1890	270	1,002	" "	" "
" " State st. junction.	1890	80	250	" "	" "
" " Lyman to State st. (between tracks)	1890		1,078	" "	" "
" " Cypress to near Franklin st.	1891	650	3,381	" "	" "
" " State to Bliss st.	1893	235	1,315	Vitrified brick	6" concrete base
" " Bliss to William st.	1893	1,148	5,475	Granite blocks	Sand
" " William to Marble st.	1896	1,762	8,307	Vitrified brick	6" concrete base
" " Marble to Locust st.	1897	810	4,381	" "	" "
" " Carew to near Franklin st. (east side)	1897	1,302	4,605	" "	" "
" " " " " " (west side)	1901	1,447	5,449	Catskill block	" "
" " Lyman to Liberty st.	1901	484	2,780	Wood block	" "
Plainfield st., s. line Sargeant to Fulton st.	1902	1,710	10,249	Vitrified brick	" "
Sanford st., Main to Market st.	1900	102	207	Rock asphalt	" "
State " Main st. to City Library	1890	1,019	4,034	Granite blocks	Sand
" " Walnut to Oak st.	1897	847	4,590	Vitrified brick	6" concrete base
" " Dwight to Chestnut st. (widened)	1896		217	Granite blocks	Sand
Summer st., Autumn st. to near Kibbe ave.	1895	1,259	4,029	" "	" "
" " Kibbe ave. to near Federal st.	1901	787	2,635	" "	" "
Walnut st., State to Union st.	1899	638	2,144	Vitrified brick	6" concrete base
" " Union to Pendleton ave.	1900	873	3,140	" "	" "
White st., Allen to Orange, in car tracks.	1902	1,610	2,400	" "	" "
Worthington st., Main to Dwight st.	1896	739	2,544	" "	" "
" " Dwight st. to Fairbanks ave	1901	1,060	3,769	" "	" "
Total		37,488	141,752		

STREETS MACADAMIZED IN 1902.

STREET AND LOCATION.	Length in Feet.	Square Yards.	Cost per Square Yard.	Cost.
Auburn street, Fulton to Main street.....	787	1,942	\$0.39	\$756.30
* Belmont avenue, 400' easterly of Woodside avenue to Hall street.....				813.93
Bowdoin street, St. James avenue to Worthing- ton street.....	1,152	3,837	48	1,825.74
Calhoun street, N. Main to Chestnut street.....	1,129	3,435	38	1,318.24
§ Chestnut street, Springfield to north line of Eagle street.....	570	1,900		
Demond avenue, Plainfield st. to Fisk avenue....	859	2,863	53	1,515.92
Florida street, Bay to Worthington street.....	1,407	4,666	47	2,191.85
Hickory street, Walnut street to Eastern avenue.	951	2,413	50	1,212.74
Holyoke street, Fulton to Main street.....	776	2,001	32	648.07
John street, Fulton to Plainfield street.....	640	2,136	44	937.84
Massasoit street, Carew to Prospect street.....	851	2,803	41	1,155.79
† Merwin street, N. Main to Chestnut street.....				1,200.00
Mill street, Pine to Dickinson street.....	1,676	6,706	48	3,245.45
Myrtle street, State to High street.....	484	997	47	463.19
Plymouth street, Fulton to Plainfield street....	479	1,597	42	676.10
Sheldon street, Birnie avenue to N. Main street..	651	2,027	68	1,382.75
State street { n. side 140' west of State street avenue to Berkshire street.....	2,898	4,922	60	9,142.24
s. side Dresden to Berkshire street.	5,287	10,362		
White street, Allen to Orange street.....	1,810	3,421	64	2,189.45
Winthrop street, Main to Dale street.....	659	2,397	58	1,386.08
Total.....	22,866	60,425		\$32,064.28

* Amounts were included in last year's table, but the work was not completed.

§ Macadamized by private parties.

† Macadamized by private parties and amounts in last year's table.

STREETS ACCEPTED AS PUBLIC WAYS DURING THE YEAR
ENDING DEC. 10, 1902.

NAME AND LOCATION.	Length.	Width.
Arch street, westerly from North Main street.....	410 feet	50 ft.
Autumn street, Summer to Worthington street.....	198 "	33 "
Banks place, westerly from Water street.....	225 "	32.5 "
Beacon street, easterly from Colton street.....	127 "	33 "
Charles street, south-ly from Liberty street.....	150 "	32.5 "
Chestnut street, extension to n. line of Eagle street.....	576 "	50 "
Dresden street, State street to Wilbraham road.....	739 "	50 "
Farnsworth street, northerly from Hamburg street.....	513 "	50 "
Firglade avenue, extension to Pineywoods avenue.....	183 "	60 "
Hamburg street, easterly from Springfield street.....	575 "	40 "
Leyfred terrace, northerly from Belmont avenue.....	630 "	70 "
Massachusetts avenue, Wilbraham road to Westford circle.....	1,459 "	84 "
Maynard street, northerly from State street.....	576 "	70 "
Oak Grove avenue, State to Burr street.....	1,040 "	60 "
Parkwood street, Sumner avenue to Forest Park.....	450 "	70 "
Sheridan lane, Morgan to Church street.....	318 "	20 "
Westford circle, easterly from Westford avenue.....	558 "	40 "
Ventura street, Sumner avenue to Alderman street.....	870 "	50 "
Wason avenue, North Main street to B. & M. R. R.....	510 "	60 "
Welcome place, northerly from Bay street.....	248 "	28 "
Wight place, easterly from Water street.....	388 "	24 "
Total length.....	10,743 feet	

STREETS RELOCATED DURING THE YEAR ENDING DECEMBER 10, 1902.

NAME AND LOCATION.

Belmont avenue, widened 10.5', south side, from Garfield street to Sumner avenue, about 1,550'.

Belmont avenue, widened from 49.5' to 69.5', from Sumner avenue to Daytona and Lawndale streets, about 1,400'.

Berkshire street, widened from 49.5' to 82.5', from State street to Chestnut street, I. O., about 15,000'.

Dickinson street, relocated from Johnson street to Kenwood park, about 350'.

Maple street, south corner of High street, rounded off.

" " widened east side, south from State street, about 400'.

Orange street, southeast corner of Dickinson street, rounded off.

Plainfield street, widened from 49.5' to 66' at B. & M. R. R., about 200'.

State street, relocated from Alden Warner's to Berkshire street, about 1,000'.

Warner street, discontinued from White to Allen street, about 3,800'.

White street, relocated from Belmont avenue to East Longmeadow line, about 1,650'.

BRICK SEWER CONSTRUCTION FOR 1902.

STREET AND LOCATION.	Size and Shape.	Length in Feet.	Total Cost.	Cost per Foot.	Average Cut in Feet.	Materials Excavated.
Hickory st.	2'-2" x 3'-3" Elliptical.	134.0	\$3,119 56	\$23 81	28.85	Rock, running sand and water
Plainfield st., Orchard st. to Newland st.	2'-4" x 3'-9" Egg-shaped.	302.5	2,367 93	7 83	14.5	Fine running sand and water.
North Main st., Arch st. to Jefferson ave.	2'-2" x 3'-3" Elliptical.	185.0	974 27	5 27	12.5	Sand and clay.
Wason ave., extension to bulkhead in river.	3'-10" x 5'-9" Egg-shaped.	29.8	886 69			
Total,		648.3	\$7,348 45			

PIPE SEWER BUILT BY PRIVATE PARTIES.

Oak Grove ave., extension northerly.	12"	256.0				Sand.
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PIPE SEWER CONSTRUCTION FOR 1902.

STREET AND LOCATION.	SIZE IN INCHES.					Total Length In Feet.	Total Cost.	Cost per Lineal Foot.	Average Depth of Cutting In Feet.	Materials Excavated
	24"	20"	18"	15"	12"	10"	8"			
Allen st., extension east to Plumtree road.						1,400.7	\$984.62	\$0.70	7.6 Sand.	
Amherst st.						25.0	23.78	95	10.5 Sand.	
Autumn st., Summer st. to Worthington st.			239.2		25.0	239.2	715.29	2.99	15.9 Clay.	
Bay st., Florida st. to Pleasant st.						244.6	321.02	1.37	8.6 Sand.	
Beaudry st., I. O., southerly from Main st.						570.7	745.95	1.31	7.5 Gravel.	
Benton st., extension southerly						320.0	419.68	1.31	5.5 Rock and sand.	
Buckingham st., Bay st. to Clarendon st.					650.5	650.5	571.47	.88	8.5 Sand.	
Cherry lane, Mill River to Central st.		397.5	431.2	291.0	294.5	1,377.2	1,454.15	1.06	7.8 Sand and clay.	
Clifton ave., southerly from Central st.						214.5	82.10	.38	4.3 Sand.	
Commonwealth ave., Belmont ave. to Wash- ington st.						1,490.9	2,878.00	1.93	13.0 Sand.	
Cornell st., extension northerly	441.2	500.3	549.4			1,490.9	2,878.00	1.93	13.0 Sand.	
East Court st., extension westerly						186.0	186.0	1.12	8.0 Sand.	
Florida st., near St. James ave. to Bay st.				4.4		66.6	119.38	1.79	9.5 Clay.	
Hampshire st., I. O., westerly from Myrtle st.	825.4					62.2	1,574.89	3.00	11.8 Sand.	
Harvard st., Yale st. to Vassar st.						300.0	196.78	.66	15.3 Sand.	
Johnson st., Dickinson st. easterly		315.7	300.0			615.7	967.94	1.57	11.8 Sand.	
Kilbee ave., Summer st. to Worthington st.		495.5				495.5	1,034.18	2.09	16.0 Sand.	
Lyons st., I. O., northerly from Main st.		260.9				260.9	652.92	2.13	9.2 Clay.	
Madison ave., northerly from Central st.				250.1		250.1	382.96	1.36	6.9 Sand.	
Magnolia ter., connection at Spruce-land ave						61.5	737.57	1.37	7.5 Sand.	
Myrtle st., I. O., southerly from Berkshire st.						180.0	189.63	1.05	8.7 Sand.	
North Main st., Arch st. to Grove st.	558.6	420.0				1,003.7	2,688.01	2.41	9.9 Sand and clay.	
Oakland st., southerly from Orange st.	895.1					895.1	2,218.71	2.47	14.1 Sand.	
Parker st., I. O., southerly from Main st.	1,098.4					218.0	119.79	.54	4.4 Sand.	
Pasco st., I. O., extension southerly						1,098.4	2,460.31	2.24	8.1 Gravel and water.	
Plainfield st., Sergeant st. to Fulton st.						102.2	47.40	.46	4.5 Sand.	
Sheldon st., west from North Main st.						1,650.9	2,625.13	1.53	11.1 Sand.	
Spruce-land ave., east from Beechwood ave.		414.0	536.6	456.1		41.5	43.87	1.06	4.8 Sand.	
Stafford st., west from Army st.						242.0	136.44	.56	5.8 Sand.	
Ventura st., north from Sumner ave.						401.5	210.53	.52	7.8 Sand.	
Wilmington st., east from Dickinson st.		349.2				350.5	289.51	.83	7.5 Sand.	
Worthington st., extension to Sackett's ave.						610.02	934.84	2.85	14.9 Clay.	
Yale st., Dartmouth st. to Princeton st.	350.2		220.5	98.1		98.1	934.84	2.85	14.9 Clay.	
			359.3	232.8		942.3	1,770.13	1.88	11.3 Sand.	
Total.						17,695.9	\$28,082.31			

COST OF SEWER SYSTEM.

Total amount expended on account of Sewers and Drains to
December 10, 1902.

1863-1880 inclusive.....	\$235,342 10	1893.....	\$35,857 56
1881.....	48,809 76	1894.....	37,710 58
1882.....	35,020 74	1895.....	34,126 83
1883.....	33,588 09	1896.....	59,037 20
1884.....	42,077 98	1897.....	46,675 42
1885.....	32,078 01	1898.....	59,543 29
1886.....	39,569 91	1899.....	62,674 06
1887.....	40,050 95	1900.....	151,285 45
1888.....	38,450 33	1901.....	89,564 02
1889.....	31,142 92	1902.....	55,458 59
1890.....	36,650 90		
1891.....	96,414 59	Total amount to date.....	\$1,582,679 79
1892.....	73,390 00		

COMPARISON OF BIDS FOR SIDEWALK CONSTRUCTION, 1902.

TAR CONCRETE.

Bidder's Name and Address.	Price Per Sq Yd.	Bidder's Name and Address.	Price Per Sq Yd.
Woodward E. Murkland, City.....	\$0 65	John W. Rochford, City.....	\$0 68
Warren Bros., Boston, Mass.....	66	Seymour & Newell, City.....	81

The contract was awarded to Mr. Woodward E. Murkland, who laid about 4,850 square yards of tar concrete sidewalk. He also resurfaced about 400 square yards at 35 cents per square yard.

COMPARISON OF BIDS FOR GRANITE CURBING, 1902.

DELIVERED ON THE CARS AT SPRINGFIELD.

Bidder's Name and Address.	Price per Linear Foot	
	4"	6"
* A. Dickinson, Shailerville, Conn.....	\$0 49	\$0 54
Haddam Granite Co., Middletown, Conn.....	46	57
W. N. Flynt Granite Co., Monson, Mass.....	50	60
John Frawley, Erving, Mass.....	51	61
Webb Granite and Construction Co., Worcester, Mass.....	55	60

* Successful bidder.

* PRECIPITATION FOR CALENDAR YEAR, 1902.

Month.	Total in Inches.	Greatest Amount in 24 Hours. Inches.	Dates.	Storms in which the Precipitation exceeded $\frac{1}{2}$ inch per Hour.	Maximum Rate per Hour. Inches.	Duration of Maximum Rate. Minutes.
Jan.	1.37	.76	26 & 27	April 30, .5 inches in $\frac{1}{2}$ hour	1.5	10
Feb.	3.09	1.35	28	June 15, .1 " " $\frac{1}{6}$ "	.6	10
March	4.84	1.29	16 & 17	July 5, .52 " " 1 "	1.0	15
April	3.70	2.00	28 & 30	" 15, .45 " " $\frac{1}{3}$ "	1.6	15
May	1.33	.53	26 & 27	" 20, .75 " " 1 "	1.8	15
June	2.86	.81	29	" 23, .20 " " $\frac{1}{3}$ "	.8	10
July	4.55	1.19	19 & 20	Aug. 11, 1.95 " " $\frac{2}{3}$ "	5.0	6
Aug.	6.70	3.86	11	" 24, .5 " " 1 "	.7	20
Sept.	6.72	1.87	9	Sept. 4, .25 " " $\frac{1}{3}$ "	1.4	20
Oct.	5.28	3.00	28	" 9, .45 " " $\frac{1}{2}$ "	.7	20
Nov.	.86	.34	26	" 20, .25 " " $\frac{1}{2}$ "	1.0	10
Dec.	5.44	2.07	21 & 22			
Total.	46.74					

* Includes rain, hail, sleet, and melted snow.

Number of days in which the precipitation exceeded .01 inch.	122
Number of days during which snow fell	14
Date of last snowfall in the spring.	March 5
Date of first snowfall in the fall.	November 30
Highest river, and date.	19'-4", March 4
Lowest river, and date.	3'-10", September 6
Annual range of river.	15'-6"
Mean daily height of river.	6'-7.3"
Greatest 24-hour rise, and date.	6'-8", March 2
Greatest 24-hour fall, and date.	4'-2", March 6

GENERAL STATISTICS.

CITY OF SPRINGFIELD, MASS., DECEMBER 10, 1902.

Springfield is situated on the east bank of the Connecticut river, in latitude 42° 06' north, longitude 72° 35' west, at an elevation above sea level of from 65 to over 215 feet.

State street, at corner of Main street, is 65.9 feet above sea level.

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner avenue, at corner of Belmont avenue, is 187.9 feet above sea level.

Population, estimated,	64,675
Number of voters: men, 12,109; women, 268; total,	12,377
Numbers of polls,	19,240
School enrollment: public, 12,162; parochial, 1,482; total,	13,644
Greatest extent of city, north and south,	5.9 miles
Greatest extent of city, east and west,	8.9 miles
Connecticut river frontage,	4.65 miles
Area, including those portions covered by water, approximately,	24,661 acres

Area by wards: Ward One, 1,733.6 acres: Two, 225.7 acres: Three, 234.8 acres: Four, 413.2 acres: Five, 400.6 acres: Six, 327.4 acres: Seven, 2,197.7 acres: Eight, 19,128.3 acres.

Total park areas, 499.18 acres: Forest Park, 463.24 acres.

Area taxed, 16,185 acres: tax rate, \$14.50 per \$1,000.

Valuation,	Real estate,	\$58,411,160	
	Personal,	15,257,590	\$74,836,048
	Resident Bank shares,	1,167,315	
Public streets accepted to Dec. 10, 1902,	Wood block,	.09 miles	
	Granite block,	2.40 miles	
	Vitrified brick,	3.42 miles	
	Sheet asphalt,	.44 miles	
	Macadam,	43.63 miles	
	Gravel or dirt,	91.40 miles	
	Catskill block,	.27 miles	
Sidewalks laid in public streets to Dec. 10, 1902,		141.35 miles	
Electric railways (double track counted twice),		47.44 miles	

* Does not include brick pavement in railway tracks on Belmont avenue and White street, and around Court square.

Annual Report

City Engineer

Springfield, Massachusetts



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1892.....	73,390 00		

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Sept.	6.72	1.87	9	Sept. 4, .25 " " $\frac{1}{3}$ "	1.4	20
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Nov.	.86	.34	26	" 20, .25 " " $\frac{1}{2}$ "	1.0	10
Dec.	5.44	2.07	21 & 22			
Total.	46.74					

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Area by wards: Ward One, 1,733.6 acres; Two, 225.7 acres; Three, 234.8 acres; Four, 413.2 acres; Five, 400.6 acres; Six, 327.4 acres; Seven, 2,197.7 acres; Eight, 19,128.3 acres.

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Area taxed, 16,185 acres; tax rate, \$14.50 per \$1,000.

Valuation,	Real estate,	\$58,411,160	}	\$74,836,065
	Personal,	15,257,590		
	Resident Bank shares,	1,167,315		

Public streets accepted to Dec. 10, 1902,	} 141.65 miles.	{	Wood block,	.09 miles
			Granite block,	2.40 miles
			* Vitrified brick,	3.42 miles
			Sheet asphalt,	.44 miles
			Macadam,	43.63 miles
			Gravel or dirt,	91.40 miles
			* Catskill block,	.27 miles

Sidewalks laid in public streets to Dec. 10, 1902, 141.35 miles

Electric railways (double track counted twice), 47.44 miles

* Does not include brick pavement in railway tracks on Belmont avenue and W^h street, and around Court square.

Annual Report
City Engineer

Springfield, Massachusetts



For the Year 1901





CITY OF SPRINGFIELD
MASSACHUSETTS

REPORT

OF



CITY ENGINEER

1903



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1000000

REPORT OF THE CITY ENGINEER.

CITY OF SPRINGFIELD, MASS., December 28, 1903.

To the City Council:—

The report of the operations of the Engineering Department for the fiscal year ending December 10, 1903, is herewith respectfully submitted.

FINANCIAL STATEMENT.

RECEIPTS.

Annual appropriation for the year 1903,	. \$10,800 00	
Receipts from other city departments,	. 1,493 91	
		<u>\$12,293 91</u>

EXPENDITURES.

Salaries of City Engineer and assistants,	. \$9,872 04	
Office rent and lighting,	. 518 72	
Drawing materials, stationery and general supplies,	780 55	
Car fares, telephone and general office expenses,	553 52	
		<u>11,724 83</u>
Balance unexpended,	. . . . .	<u>\$569 08</u>

DESCRIPTION OF EXPENDITURES.

ENGINEERING DEPARTMENT.

For all services performed on account of matters referred to the Board of Public Works by the City Council relating to the laying out or alteration of streets, sidewalks, sewers, and parks; for surveys and levels, plans and profiles, estimates of cost, releases from damages, reports to the City Council, and general

correspondence relating to matters referred to the Board, and all clerical work performed relating to public hearings and all meetings of the Board; measuring and assigning house numbers, work upon house number books and records and making new plans; furnishing street lines and grades to individuals for buildings, grading, fencing, and sidewalk construction; surveys, estimates, and all general services performed for the various committees of the City Council; general map, plan, and profile drawing of streets, sewers, and public property for office records and for future reference; measuring and recording all sewer connections for house drains, the inspection of all sewers laid by private individuals in streets not public, examination and testing of material for same, and furnishing lines and grades; preparation of plans for the City Solicitor's use and attendance at court; indexing plans furnished by the quasi-public corporations, office plans and other records; photographing and blue-printing, examination of deed records, setting of street monuments, and all other services not charged to other city departments (including \$171 for Bridge Commissioners' plan and \$188 for Springfield-Wilbraham town boundary survey), the sum of

\$8,378.13

HIGHWAY DEPARTMENT.

For all services performed on account of and charged to the street work appropriation; estimates and plans, lines and grades for paving, macadam and gravel, inspection of contract work, final measurements, and all other incidental work, the sum of

\$353.24

SIDEWALK AND CURBING DEPARTMENT.

For all services performed for the general sidewalk and curbing appropriation; lines and grades for laying out and construction, measurements for assessments, and all work incidental thereto, the sum of

\$445.07

SEWER DEPARTMENT.

For all services performed on account of the general sewer appropriations; plans, estimates, borings, laying out of work and general supervision of construction details, and all other incidental work, the sum of \$341.57

WATER DEPARTMENT.

For all services performed for the Water Department (including \$7.40 charged to the Water Supply Commission for maps of the city showing water mains), estimates and levels, lines and grades for buildings, fences and drains at Bridge street property; map of drainage area of Westfield river; measuring and plotting water mains, and all incidental work, the sum of \$99.04

SCHOOL DEPARTMENT.

For all services performed for the School Department, giving grade for walks at the Glenwood and Chestnut street schools, the sum of \$12.79

PARK DEPARTMENT.

Making blue prints, etc., the sum of \$9.50

PAUPER DEPARTMENT.

Making blue prints of almshouse plans, the sum of 75 cents.

STREET WATERING DEPARTMENT.

Making plans, etc., the sum of \$6.00

SOUTH END BRIDGE SEPARATION OF GRADES.

For all services performed in connection with the separation of grades at South End bridge; estimates, lines and grades for laying out and constructing Pecousic avenue approaches to bridge, and all other incidental work, the sum of \$137.24

SPRINGFIELD STREET RAILWAY, EASTERN STREET RAILWAY,
UNITED ELECTRIC LIGHT, AND POSTAL TELEGRAPH
CABLE COMPANIES.

For all engineering services giving lines and grades for poles, paving and conduits, and making plans of conduits, the sum of \$69.39

MISCELLANEOUS SERVICES.

Measuring oil tank for Gilbert & Barker; relocating and resetting street monuments disturbed in building operations, \$11.32

GENERAL WORK OF THE DEPARTMENT.

The work of the year has, in the main, been of a more general character with less than the usual amount of special undertakings. This has given rather more than the usual amount of time for the prosecution of work for which but little or less time is permitted during the years when special work is in progress.

There is a considerable amount of work that should be undertaken to place the office records in more complete condition for use and reference.

The average City Engineering office is supposed to be a bureau of general information to which nearly everybody may refer, and it has been found that much time may be saved by keeping all records in such condition that they can be referred to without uncertainty and loss of time.

The street numbering records are not of the form that affords the best and most economical results in assigning house numbers. Considerable time is expended for this work that might be avoided if more complete office records were available. The changing over of the records has been deferred from time to time awaiting the further progress of the survey and mapping of the city lots and streets, which was first undertaken about thirty years ago and only carried on far enough to cover the business portion of the city, nothing having been done for seven or eight

years, owing to the lack of appropriations for prosecuting the work.

PAVING AND STREET WORK.

Less than the usual amount of paving has been performed owing to the uncertainty of the various calls for moneys appropriated for the department of Highways and Bridges that might be made during the year. As it was determined that the appropriation for street work should provide for raising South End bridge and grading Pecousic avenue, a very considerable sum was retained for this work which otherwise might have been expended in improved pavements.

WORTHINGTON STREET.

The vitrified brick pavement in Worthington street has been extended a short distance from Fairbanks place to Spring street, Syracuse vitrified brick having been employed, laid on a six-inch concrete base and joints filled with pitch.

A considerable portion, or all of Worthington street occupied by street car lines, could be paved with economical results, the time for economical maintenance with macadam having passed years ago.

BELMONT AVENUE.

The paving of Belmont avenue between rails of street car track and eighteen inches outside has been extended to Oakland and Garfield streets, the Metropolitan block having been used, laid on a six-inch concrete base. This work was performed in connection with the macadamizing of Belmont avenue for the space outside the paving.

MAIN STREET.

As the dissatisfaction still continues on the part of those using the creo-resinate wood block pavement at the Main street

arch and approaches to same, an attempt has been made to remedy the slipperiness of this pavement.

A contract was made with the United States Wood Preserving Company to replace the section of paving laid by them in 1901 between Lyman and Liberty streets with a special grooved block, the groove used being one fourth of an inch in width and one and one fourth inches in depth, formed by sawing away from one side of each block. The old blocks were removed and the new blocks substituted, the joints after laying of blocks filled with cement grout for nearly the full depth, with a small quantity of sand in the top of joint. The work of laying the new blocks was sublet to John W. Rochford of this city, who prosecuted the work to completion with diligence and satisfaction.

The wood blocks removed were used for extending the Main street pavement southerly to Worthington street on the easterly side of the street car tracks and as far south as Hampden street on the westerly side of the tracks.

The pavement was extended northerly to Sharon street on the easterly side of the street car tracks only. A considerable quantity of new blocks was furnished and laid between Lyman and Worthington streets. The work of laying the blocks, as well as the six-inch concrete base for foundation, was performed by the Street Department and its regular employees.

At the end of this report will be found a tabular statement of the amount and cost of this work as well as the other paving work done during the year.

STREET WIDENINGS AND NEW STREET LAYOUTS.

Only a limited amount of this work has been performed during the year, there having been no extension or double tracking of street car lines to necessitate street widenings or relocations.

BELMONT AVENUE.

The widening of Belmont avenue on the southerly side between Garfield street and Sumner avenue, increasing the width of the street from $49\frac{1}{2}$ to 60 feet, was performed during the season in conformity to the City Council's order of 1902. This widening was performed in anticipation of the double tracking of the street car line in Belmont avenue between the points mentioned, but as a franchise was granted about this time for an extension of the line to East Longmeadow, the street railway company decided to locate its double track turnout beyond or easterly of Sumner avenue. However, the expense of the widening was supposed to have been included in the amount paid the city by the street railway company for the several franchises granted them by the Board of Aldermen of 1901.

The widening constitutes a marked improvement. A new sidewalk has also been laid on the same side and for the whole length of the widening.

PECOUSIC AVENUE.

Pecousic avenue has been laid out over private lands in connection with the abolition of the railroad grade crossing at the east end of the South End bridge, thereby forming an approach north and south to the elevated, inclined approach to the railroad crossing of the New York, New Haven and Hartford railroad and the South End bridge.

Pecousic avenue was made 50 feet wide with a macadamized roadway 30 feet in width, and a cinder sidewalk 6 feet wide.

The length of the new layout is about 2,000 feet or about 1,000 feet northerly and southerly of the approach to the railroad crossing. The layout was made by the special commission appointed to determine the changes necessary at the grade crossing, and as a part of the general scheme. The new location

terminated at either end in South street, South street not having been discontinued opposite to the new layout.

The new location of Pecousic avenue forms a part of the proposed avenue by the same name extending north to Water street at the junction with Gardner street, and south through Forest Park to the Longmeadow line. The avenue, taken as a whole, has been proposed for a width of 100 feet, and has been so laid out and established from York street to South street at "Walker's corner." The part laid out and graded this year forms the westerly half of the proposed 100-foot location for the main part of its length.

The material for the grading of Pecousic avenue was taken from the location (as proposed) southerly of Pecousic brook. At this point a deep cut is proposed in order to improve the grade and remove in part a sharp curve in the existing location of Longmeadow street, southerly from said brook.

CAREW STREET.

Carew street, or Morgan road (sometimes so called), has been graded in part in accordance with the City Council's order passed early in the year for widening between Liberty street and St. James avenue. A roadway 20 feet in width has been graveled as far as the grading extended; the balance of the grading should be performed during the coming year and the roadway graveled.

WORCESTER STREET, INDIAN ORCHARD.

In connection with the new occupation and development of the Fiberloid Company's extensive plant on Worcester street, Indian Orchard, a petition was presented the City Council for the widening, relocation and alteration of grade of Worcester street between the narrow underpass under the Athol branch of the Boston and Albany railroad and Chestnut street. Under

this petition an order was passed for the relocation and widening, also for the change of grade of the hill.

In connection with the franchise given by the Board of Aldermen to the Springfield Suburban Company for the construction of a street car line through Worcester street, it was provided, among other things, that the company should grade the hill and gravel the roadway, but as the State Board of Railroad Commissioners has recently refused the company its consent to construct the line, there would appear to be no immediate prospect of securing the company's cooperation.

The city entered into a contract with Joseph W. Weeks, Jr., of this city, for grading the hill, the contract requiring a roadway 24 feet wide and a six-foot sidewalk on the northerly side, the roadway to be graveled to a depth of six inches and sidewalks also hardened with gravel. Railings were also provided for on either side of the long fill at the foot of the hill. About 20,000 cubic yards of earth materials were removed at a cost of 18½ cents per cubic yard. Mr. Weeks successfully completed the work early in December, and this section of Worcester street is now in good condition.

The narrow underpass under the railroad has not yet been altered, but a change will be necessary before any street car line can be constructed that shall pass under the railroad at this point, the underpass being but 13 feet wide with a clear headroom of 9½ feet.

The new location made on either side of the railroad contemplates crossing the railroad on an angle of about 45 degrees instead of the present angle, which is nearly square.

It has also been proposed that an elevation of the grade of the railroad be made at this crossing, as the grade of the present road surface is level with the adjoining swamp. This would in no way be injurious to the grade of the railroad, which at this point forms a considerable sag or depression, and an increase of grade for the street would be avoided as the present

grade of the street rises in both directions from the railroad crossing.

The relocation of Worcester street provides for a width of 60 feet, whereas the old county road was but $49\frac{1}{2}$ feet, and a considerable part of the last named width was absorbed in the location of the Athol and Enfield railroad, so that the part of the old way lying contiguous to the railroad was limited to a very narrow width, hardly sufficient for ordinary travel without trespass upon adjoining private lands. Just how this transaction was ever permitted could not be ascertained, as no record could be found of the procedure, and it is presumed that the railroad company assumed the ground occupied without permission or hindrance.

The average grade of the Worcester street hill, prior to the grading, was about 8 per cent; this the new grade has reduced to 6 per cent.

Before the changes proposed at the railroad crossing can be effected, an appeal must be made to the Board of County Commissioners, who are authorized by law to determine such questions.

SEWERAGE.

Although the moneys appropriated for sewer work, together with the receipts from sewer entrance fees, have been in the main expended, nothing outside of the regular work has been performed. An attempt was made early in the year to close up the securing of rights of way for the proposed extension of the Mill river valley intercepting sewer; such rights were secured early in the season, and the Board of Public Works' report, and the estimate of cost by this department, sent in to the City Council in season for the undertaking of the work, but as much objection was made to the estimated cost for land damages, the matter was recommitted to the Board of Public Works for reconsideration, and an attempt is being made to reduce the amount to be paid for crossing private lands.

The sewer proposed to be laid will extend from the present terminus at Hickory street across private lands adjoining the north shore of Massasoit lake, or Water Shops pond, for a distance of about one mile to the point where Hickory street is again entered.

A considerable demand for this sewer is being made by the residents of Gunn Square, who are outside of the limits of the system of sewers contiguous to their district.

STATE STREET SEWER.

An extension of the new brick sewer laid in Dwight street in 1896 has been made in State street as far easterly as the westerly line of the high school property in order that suitable drainage facilities might be afforded for the large new insurance building being erected at the corner of State and Maple streets. The extension will also be of use in the future extension to Benton park and will entirely replace, when extended, the present old sewer in State street, which is so shallow in most places that only very unsatisfactory results are obtained. The building of the sewer also permitted the cutting off of the old Card Factory Pond brook at the high school property, thereby doing away with the flow of the brook across the private lands between the point of diversion and Maple street. The presence of the old brook was a serious obstacle to the erection of the new insurance building.

The new sewer was laid with some difficulty owing to the considerable depth near Maple street, and the presence of subsoil water and an unstable soil. At the termination of the work the subsoil greatly improved and the ground water entirely disappeared.

SUMNER AVENUE SEWER.

An extension of the sewer laid in Sumner avenue two years ago was made from White street easterly to Irvington avenue,

in order to afford sewerage facilities for the buildings on Irvington avenue, and may, when necessity demands, be extended still further to the easterly limits of the watershed, a short distance east of the New York, New Haven and Hartford railroad.

PLAINFIELD STREET SEWER.

The extension of the sewer in Plainfield street, made in the early summer of 1902, was at that time abandoned, as it was thought that later in the season better conditions might be obtained. A large amount of underground water and a very unstable soil was found at the time and it was expected that the work could be again prosecuted in the fall season if the season should be dry. However, when the fall season arrived the moneys available had been nearly expended and the work was not undertaken again until the late fall season of the present year.

In the work performed recently it was found that no improvement was to be expected in the character of the subsoil, it being a fine running sand which flowed freely under the presence of ground water. It was found necessary to provide a timber foundation for the sewer consisting of sills and cross planking. The lower part of the sewer was laid in concrete up to the springing line of the arch. This increased the cost considerably but was unavoidable in order that sound, stable work might be secured.

The sewer was extended to Roseland street, and immediately on its completion the sewer in Roseland street was laid far enough to provide for the new dwellings erected during the summer season.

WORTHINGTON STREET SEWER.

The brick sewer laid in Worthington street in 1885, draining a large section of territory, has some years since been found

inadequate to carry off the excessive flow of heavy storms without flooding tributary sewers and cellars in the locality.

As the result of these conditions a recommendation was made two years ago upon which an order was passed providing for the enlargement of the sewer by increasing its height. At the time the sewer was first constructed the locality was largely undeveloped. Since then buildings have been erected and street surfaces improved over the entire area drained, thereby causing the storm water to get away to the sewers more quickly and in larger volume.

The sewer was increased in height two feet by removing the arch and raising the side walls vertically and replacing the arch, increasing the sectional area so that its area of cross-section is equal to an egg-shaped sewer with dimensions of 4' 2" x 6' 3". The work was started at the top of the steep grade at Bowdoin street and extended easterly to Ingersoll Grove street. It will be necessary to extend this work to St. James avenue and through Dartmouth street to Yale street before the section will be entirely relieved of the annoyances now existing.

CEMETERY BROOK.

The city was petitioned a year or two ago to take some action that would relieve the old brook structure lying between Maple and Morris streets from the surplus of storm water and lessen the difficulties arising from interference with building foundations.

The brook structure now carries the entire drainage from the Springfield Cemetery as well as Avon place, an area of about fifty-five acres comprising a large proportion of steep sidehill territory that in times of heavy storms sheds the water away to the brook very quickly.

A general study of the situation showed that the most feasible plan to pursue would be to enlarge and improve the present brook structure rather than to divert the flow in whole or in part.

A release was taken from the various owners of land between Maple and Morris streets conveying to the city the right to occupy the premises for the purpose of reconstructing the sewer and maintaining the same, which rights all were glad to give with the exception of one owner who preferred to assume the care and maintenance of the brook upon his own premises.

It was found that portions of the brook had been reconstructed in years gone by and placed in reasonably good condition, this part lying next to Maple street and below the same, extending partly across the lot owned by Mrs. English; between this point and Morris street the old brook structure passes under several dwellings and was found to consist of a board bottom, dry rubble walls, and stone flagging laid on top. As all stone work was laid dry, so far as could be ascertained, it was easy to understand how the undermining of ground surfaces and building walls has taken place in former times. The brook has a very steep grade, and the velocity, when flowing full, doubtless amounts at times to 15 feet or more per second, the dimensions of the old structure being about 20 inches in height and 30 inches in width.

It was ordered that a new 24-inch vitrified pipe sewer be laid from the termination of the sewer in Morris street to intersect the old brook structure on land of Mrs. English, a length of 176 feet, the location being northerly of the old brook and outside of all buildings. At the upper end of the new work and just below the same, the old brook was closed up, all but an opening 8 inches in diameter, which will receive the ordinary dry weather flow, and the present duty of the new sewer will be to carry off the surplus of storm water which formerly so overcrowded the old brook conduit.

It is expected that the property owners under whose buildings the brook now flows will find it to their advantage to carry their house drains to a connection with the new work, and make it possible to entirely abandon the old brook structure.

Above the point of connection of the new work with the old on Mrs. English's land, it was found that the brook structure was in good condition and repair, consisting of a plank bottom with brick masonry laid in mortar for sidewalls and semicircular arch, the dimensions being 2' 9" in width and 4' 9" in height.

It was considered that the city should assume the care and control of the brook, inasmuch as it uses the same for the drainage of Avon place and adjoining lots and buildings; it also serves to drain the surface water from Maple street between Mulberry and Central streets.

At the end of this report will be found a tabulation of all the sewers laid during the year, including the pipe sewers, together with their cost.

SOUTH END BRIDGE GRADE CROSSING.

After a period of two or three years, during which the city and the New York, New Haven and Hartford Railroad Company had sought to find some feasible plan upon which the grade crossing at the easterly end of the South End bridge could be abolished, it was decided to appear before the special commission, appointed by the Superior Court in 1901, and present the various schemes with their cost for their consideration.

Two years ago it was decided by the city that the most feasible plan would be the adoption of a straight, direct approach in continuation of South End bridge across the railroad to a new avenue to be laid out along the foot of the side-hill nearly parallel to the location of South street. This involved for the direct approach a length of less than 250 feet with a 4 per cent grade.

The plan presented by the railroad company, after crossing over the railroad tracks, involved two inclined approaches connecting with the present location of South street, these inclines to have a length of about 600 feet each on a 4 per cent grade. As these inclines absorbed the present location of South street

for the length of the two inclines, it was proposed to provide a new way 50 feet wide easterly of and adjoining the inclines in order to provide for the travel north and south between the city and Longmeadow.

After much expenditure of time in examination of plans and hearing of testimony as to cost of the different schemes, it was mutually agreed between the city and railroad company to unite upon the plan presented by the city with some modifications of width and other small features.

The plan as finally adopted involved the bridging over the railroad tracks with three short spans of plate girder bridges, one span covering the width of South street which adjoins the railroad location, and which provides for an underpass in South street for the accommodation of the owners of property abutting upon South street.

The bridge span adjoining the South End bridge has a length of 49.2 feet, the span over the main tracks of railroad, 80 feet, and the span over South street which provides for the underpass, 54 feet, the span over the main tracks having a clear headroom of 18 feet. The two westerly spans have a level grade, while the easterly span has the same grade as the incline, 4.5 per cent, all spans having a clear width of 20 feet with a double flooring of wood. It was proposed by the city that a permanent floor should be provided in which the railroad company did not concur because of added cost. The remainder of the incline is an earth fill and has a length of 230 feet with grade of 4.5 per cent, a width over all of 31 feet, 20 feet of this width macadamized with paved gutter, and one 6-foot cinder sidewalk on the northerly side.

The elevation over the railroad tracks also involved the raising of the South End bridge over the Connecticut river, the city proposing a change of the whole length of the bridge, a length of 1,349 feet, resulting in a grade of a little more than 1 per cent.

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road company proposed the alteration of the four spans only, with a rise of 15.5 feet at the easterly end. The plan was finally ordered in the decree of the commission.

In the meantime the United States authorities exercised jurisdiction over the navigability of the Connecticut River and ordered the city to raise the fourth span of the bridge and to construct a draw span. It was further provided in the decree of the commission that if the city preferred, the bridge might be raised its entire length, the city to bear the added cost of raising the bridge over the plan involving the raising of the four easterly spans only.

The commission decreed that the railroad company should erect the bridge over the railroad and South street, also grade and macadamize the inclined approach, and the city perform the work on the South End bridge and the grading and macadamizing of Peconsic avenue.

The contract for raising the South End bridge was let to Mr. Trask of this city for the sum of thirteen thousand five hundred dollars (\$13,500) which included the steel columns and the piers for supporting the bridge, as well as the work of raising the bridge. Mr. Trask sublet the steel work and connections to Henry L. Norton of this city.

Mr. Trask began the work of raising the bridge early in the spring and all work was in place and connections made in the summer of 1901. Mr. Trask performed the work of raising the bridge on the tops of the present piers without the use of false supports.

The work of grading and macadamizing Peconsic avenue from its westerly end at South street to its southerly end, also the work on South street, was by the terms of the decree of the commission ordered by the city. The layout provides for a width of 40 feet which includes a macadam roadway 30 feet wide and a 5-foot sidewalk on the westerly side. The work involved the bringing in of about 15,000 cubic yards of fill; and about 7,300 square yards of macadamizing.

ST. JAMES AVENUE BRIDGE.

A new overhead bridge of plate girder type has been constructed by the New York, New Haven and Hartford Railroad Company at the crossing of St. James avenue over the Highland Division of the New York, New Haven and Hartford railroad, the bridge having been erected by joint agreement between the city and railroad company made and concluded in 1901, the cost to be shared equally by the city and railroad company. The bridge has 18 feet and 3 inches clear headroom over the railroad tracks, and a clear span of 45 feet, with a width of 66 feet, the full width of St. James avenue. The structure has a roadway 50 feet wide with two sidewalks 8 feet in width, floor of two thicknesses of plank, 3-inch hard pine for under floor and 2-inch spruce for wearing surface.

As in the case of the old structure, the railroad company is to provide for the maintenance of the entire structure, including flooring. The flooring on the new structure is 2 feet higher than the floor of the old structure.

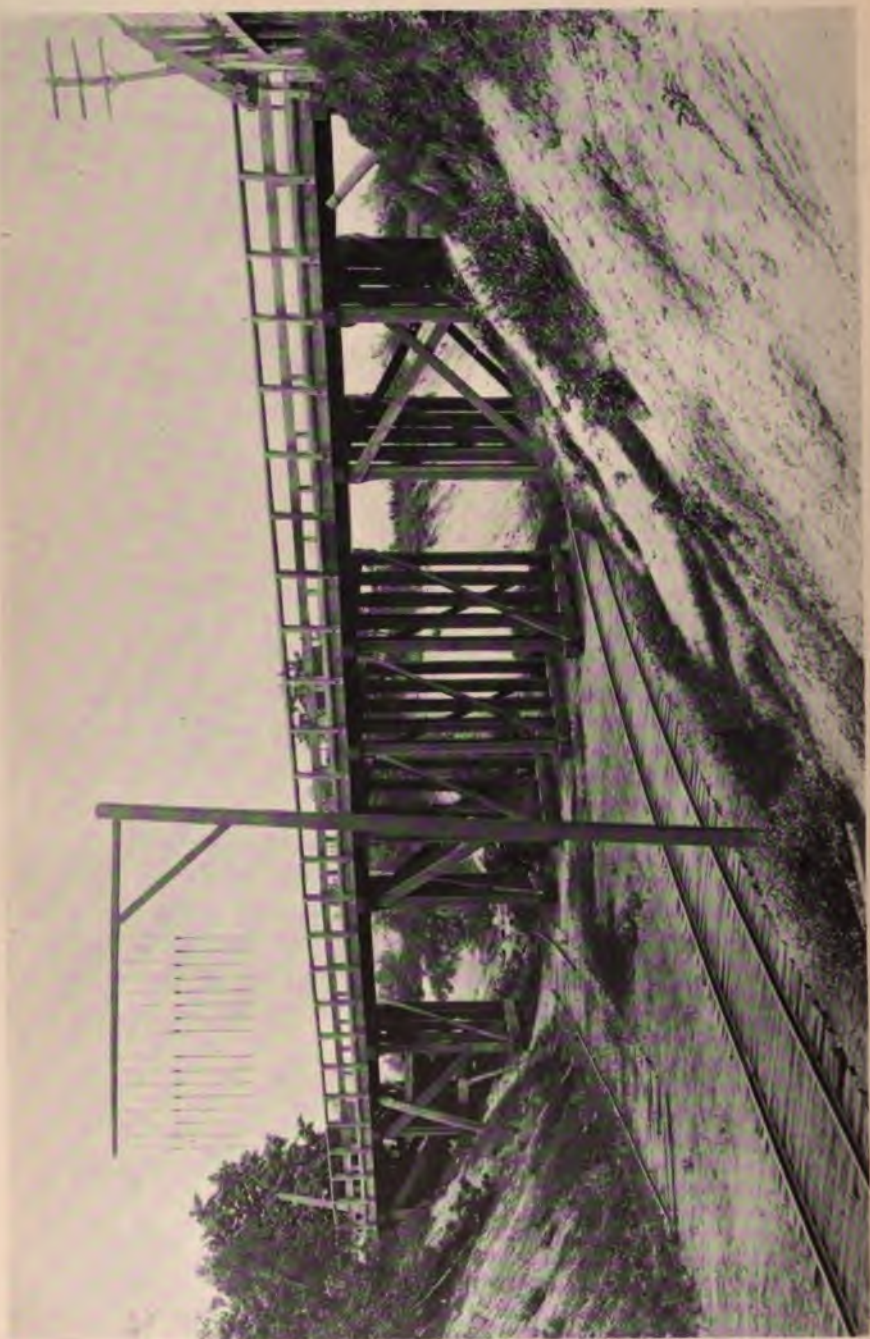
BOARD OF PUBLIC WORKS.

The usual duties have been performed for the Board of Public Works, which includes the attendance at 48 hearings and office meetings besides the preparation of all plans, profiles and estimates of cost and the preparation of all reports to the City Council upon the various matters referred to the Board for investigation and report.

COMMITTEE ON FRANCHISES.

Considerable time was expended in the early summer in assisting the special committee appointed by the Board of Aldermen to prepare and submit a form of franchise for the Springfield Suburban Street Railway Company, who applied for a location from the business section of the city across the town-





OLD ST. JAMES AVENUE BRIDGE, BUILT BY SPRINGFIELD, ATHOL AND NORTHEASTERN RAILROAD COMPANY,
AND THE SPRINGFIELD AND LONGMEADOW RAILROAD COMPANY, 1873-1875.



NEW ST. JAMES AVENUE BRIDGE, BUILT IN 1903 BY NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY.
COST SHARED EQUALLY BY RAILROAD COMPANY AND CITY OF SPRINGFIELD.

ship to the Ludlow line. Various drafts were prepared and some other cities visited at the request of the committee.

TOWN BOUNDARIES.

The boundary lines have been perambulated with the adjoining towns of Longmeadow, East Longmeadow, Wilbraham, and Chicopee. Reports have also been drawn for the location, the special committee appointed to perambulate having appointed the City Engineer to act for them in this matter.

A general survey of the Wilbraham line in the early spring season for the purpose of obtaining additional data for use in constructing a new road map of the entire township, showed that the stone monuments placed at the various road crossings were all, with one exception, located in Springfield, being from $1\frac{1}{2}$ to $13\frac{1}{4}$ feet west of the line. After a conference with the City Solicitor the selectmen of Wilbraham were informed that it is the duty of towns and cities in this state to maintain the town boundary monuments at highway crossings upon the line.

The selectmen gave the information that they did not consider themselves empowered to act in such matters, but would call attention to the matter at the next town meeting.

DEPARTMENT EMPLOYEES.

The regular force employed, which has been constant throughout the year with the exception of Mr. Howard O. Buck who terminated his services with this department in March, has been made up as follows:—

Principal assistant, Walter A. Brown.

Instrument men and draughtsmen, Herbert E. Flint, Charles A. L. Wright, Edward G. Martin, Howard O. Buck, Ernest F. Young.

Rodmen and draughtsmen, Charles J. Hancock, Harold T. Murphy, Orrin F. Cooley.

Clerk, stenographer, and typewriter, Miss Edith I. Gibbins.

J. Beckwith, A. P. Slocum and F. L. Hunn were briefly employed for periods of a few days only.

For the earnest coöperation of the assistants employed, and the courtesies extended by the various members of the City Council, I desire to return thanks.

Respectfully submitted,

CHARLES M. SLOCUM,

City Engineer.

BOARD OF ALDERMEN, December 28, 1903.

Read, accepted, ordered printed, and sent down for concurrence.

E. A. NEWELL, *Clerk.*

COMMON COUNCIL, December 28, 1903.

Read and concurred.

H. S. GILBERT, *Clerk.*

Presented to the Mayor for approval, December 28, 1903.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, SPRINGFIELD, MASS., December 28, 1903.

Approved.

E. E. STONE, *Mayor.*

PAVING LAID IN 1908.

LOCATION.	Material.	Foundation.	Length in Feet.	Area in Square Yards.	Cost.	Cost per Square Yard.
Belmont av., Hall to Oakland st., between rails and 18" outside	Metropolitan block.	6" concrete base	1,023	914	\$2,115 16	\$3 31
Charles st., Liberty st. to land of B. & A. R. R.	Granite block	Sand	150	376	306 83	82
Main st., north line of Hampden to south line of Lyman st. (west side)	(laid in cement)	6" concrete base	(153)	396		
Main st., south line of Worthington to south line of Lyman st. (east side)	Creo-resinate wood block (1" sand cushion)	6" concrete base	535	1,341	10,318 59	\$3 58
Main st., north line of Liberty to north line of Sharon st. (east side)	Creo-resinate wood block (1" sand cushion)	6" concrete base	453	1,135		
Main st., south line of Lyman to north line of Liberty st.	Grooved creo-resinate wood block (1" sand cushion)	6" concrete base	484	2,780	No cost to city.	
Main st., crossing through parking opposite Patton st.	Catskill and Metropolitan blocks	6" concrete base	(43)	183	453 06	2 77
Worthington st., Fairbanks place to east line of Spring st.	Syracuse brick	6" concrete base	269	1,003	2,541 38	2 53
Total length of new work			2,914	8,128		

* This price includes \$2.10 per square yard paid for all the blocks used, both new and old.

The city removed the blocks between Lyman and Liberty streets and placed them in the new work as far as they would go, the U. S. Wood Preserving Company laying grooved blocks between Lyman and Liberty streets in their stead. The area between Hampden and Lyman streets, on the west side, was paved with new blocks laid on a cushion of Portland cement mortar mixed one part cement to eight parts sand; the blocks were embedded in the mortar by hand-ramping immediately after laying, and then grouted with cement. The concrete base consists of Rosendale cement, sand, and crushed trap rock, mixed in the proportions of one, two, and four.

PAVEMENTS SUPERSEDED BY OTHER MATERIALS, 1903.

LOCATION.	Material Removed.	Length in Feet.	Area in Square Yards.
Main st., s. line Worthington to s. line Lyman st. (east side)	Granite block	535	1,341
Main st., n. line Hampden to s. line Lyman st. (west side)	Granite block	(153)	396
Main st., s. line Lyman to n. line Liberty st. ("regular" superseded by "grooved" blocks)	Creo-resinate		
Main st., n. line Liberty to n. line Sharon st. (east side)	Wood block	484	2,780
Main st., small strip west of east track at crossing opposite Patton st.	Granite block	453	1,135
	Syracuse brick		20
Total		1,472	5,672

LENGTH AND AREA OF STREETS PAVED TO DECEMBER 10, 1903.

LOCATION.		Date of Laying.	Length in Feet.	Area in Square Yards.	Kind of Pavement.
Belmont av., 400' east of Woodside av. to Hall st.	.....	1901.....	1,302.....	1,211.....	Catskill block
" " Hall to Oakland st., in car tracks	.....	1903.....	1,023.....	914.....	Metropolitan block
Bridge st., Main to Dwight st.	.....	1900.....	688.....	2,525.....	Rock asphalt
Catharine st., State to Bay st.	.....	1900.....	1,722.....	5,691.....	Syracuse brick
Charles st., Liberty st. to land of B. & A. railroad	.....	1903.....	150.....	376.....	Granite block
Chestnut st., Lyman st. to B. & A. railroad	.....	1889.....	256.....	1,471.....	" "
" " B. & A. railroad to Linden st.	.....	1892.....	1,640.....	5,235.....	" "
" " Linden to Carew st.	.....	1893.....	773.....	2,156.....	" "
" " Worthington to Lyman st.	.....	1895.....	472.....	1,673.....	" "
" " Carew to Allendale st.	.....	1900.....	1,015.....	3,432.....	Syracuse brick
Court st., Court Square av. to Main st.	.....	1897.....	317.....	1,277.....	Rock asphalt
" " " " easterly	.....	1897.....	.....	174.....	Syracuse brick
" " Square av., Court to Elm st.	.....	1897.....	193.....	503.....	Rock asphalt
" " " " " "	.....	1897.....	.....	330.....	Syracuse brick
" " " " " "	.....	1896.....	2,324.....	9,905.....	" "
Dwight st., State to Lyman st.	.....	1900.....	117.....	297.....	Rock asphalt
East Court st., Main to Market st.	.....	1897.....	343.....	949.....	" "
Elm st., Court Square av. to Main st.	.....	1897.....	.....	330.....	Syracuse brick
" " " " " "	.....	1895.....	670.....	1,770.....	Granite block
Fort st., Water to Main st.	.....	1896.....	586.....	2,247.....	Trinidad asphalt
Harrison av., Main to Dwight st.	.....	1900.....	1,399.....	4,571.....	Syracuse brick
Liberty st., Chestnut to Cass st.	.....	1901.....	1,147.....	3,971.....	" "
" " Cass st. to Heywood av.	.....	1889.....	1,305.....	4,599.....	Granite block
Lyman st., Main to Chestnut st.	.....	1887.....	.....	432.....	" "
Main st., Elm to Court st. (west side)	.....	1888.....	1,550.....	5,857.....	" "
" " State to Bridge st.	.....	1889.....	634.....	1,328.....	" "
" " Bridge to Hampden st.	.....	1890.....	270.....	880.....	" "
" " Liberty to Cypress st. (west side)	.....	1890.....	80.....	250.....	" "
" " State st. junction	.....	1890.....	.....	1,008.....	" "
" " State to Hampden st. (between tracks)	.....	1891.....	650.....	3,381.....	" "
" " Cypress to near Franklin st.	.....	.....	.....	.....	" "

LENGTH AND AREA OF STREETS PAVED TO DECEMBER 10, 1903.—Continued.

LOCATION.	Date of Laying.	Length in Feet.	Area in Square Yards.	Kind of Pavement.
Main st., State to Bliss st.	1893.	235.	1,315.	Syracuse brick
" " Bliss to William st.	1893.	1,148.	5,475.	Granite block
" " William to Marble st.	1896.	1,762.	8,307.	Syracuse brick
" " Marble to Locust st.	1897.	840.	4,381.	" "
" " near Franklin to Carew st. (east side)	1897.	1,302.	4,605.	" "
" " Emery to Sargeant st. (west side)	1901.	1,447.	5,449.	Catskill block
" " Worthington to Lyman st. (east side)	1903.	153.	1,341.	Grooved wood block
" " Hampden to Lyman st. (west side) 153' in length	1903.		396.	" "
" " Lyman to Liberty st.	1903.	484.	2,780.	" "
" " Liberty to Sharon st. (east side)	1903.	453.	1,135.	" "
" " crossing opposite Auburn st.	1903.		163.	Catskill and Metro- politan block
Plainfield st., s. line Sargeant to Fulton st.	1902.	1,710.	10,249.	Syracuse brick
Sanford st., Main to Market st.	1900.	102.	207.	Rock asphalt
State st., Main st., to City Library	1890.	1,019.	4,034.	Granite block
" " Dwight to Chestnut st. (widened)	1896.		217.	" "
" " Walnut to Oak st.	1897.	847.	4,590.	Syracuse brick
Summer st., Autumn st. to near Kibbe av.	1895.	1,259.	4,029.	Granite block
" " Kibbe av. to near Federal st.	1901.	787.	2,635.	" "
Walnut st., State to Union st.	1899.	638.	2,144.	Syracuse brick
" " Union st. to Pendleton av.	1900.	873.	3,140.	" "
White st., Allen to Orange st., in car tracks.	1902.	1,610.	2,400.	" "
Worthington st., Main to Dwight st.	1896.	739.	2,544.	" "
" " Dwight st. to Fairbanks place	1901.	1,060.	3,869.	" "
" " Fairbanks place to Spring st.	1903.	269.	1,003.	" "
Total		39,805	145,151	

The granite blocks are all laid on sand; all other pavements laid on 6" concrete base with 1" sand cushion.

STREETS MACADAMIZED IN 1903.

STREET AND LOCATION.	Length in ft.	Area in sq. yds.	Cost.	Cost per sq. yd.
*Agawam st., Pecousic ave. to South st....	230	383		....
Alexander st., North to Chestnut st.....	414	1,380	\$679.86	\$0.493
Andrew st., State to n. curb line of Burr st.	1,008	3,213	1,466.41	.456
Autumn st., Worthington to Summer st....	197	504	424.36	.842
Beech st., Central to Florence st.....	528	1,303	693.64	.532
Belmont ave., Hall to Oakland st.....	1,023	2,533	1,879.29	.741
Churchill st., Sumner ave. to Garfield st...	575	1,919	935.33	.487
College st., Wilbraham road to State st....	527	1,522	679.89	.447
East Hooker st., N. Main to North st.....	679	1,786	915.23	.512
Edwards st., Chestnut to Elliott st.....	675	2,219	1,008.70	.455
Forest Park ave., Sumner ave. to Forest st..	752	3,846	2,199.87	.572
Franklin st., Cass to Webster st.....	668	2,278	1,475.73	.648
Garfield st., Forest Park ave. to Belmont ave.	1,577	5,220	2,960.58	.567
Grove st., N. Main to North st.....	612	1,734	883.68	.510
Grosvenor st., North to Chestnut st.....	738	2,286	1,012.14	.443
Hancock st., Walnut to Florence st.....	325	1,083	664.13	.613
Harvard st., Yale st. to St. James ave.....	883	2,933	1,212.75	.413
Hawthorn st., Spruce to Hancock st.....	540	1,374	575.96	.419
Hebron st., North to Chestnut st.....	698	2,204	951.67	.431
Hickory st., easterly from Alden st.....	1,435	3,513	2,073.90	.590
King st., Eastern ave. to R. R. crossing.	599	2,015	892.24	.443
½Liberty st., easterly line Wolcott to n. line Carew st.....	2,800	6,634	3,944.32	.595
½Main st., I. O., Pine st. to point 104' east of Rogers ave.....	2,844	9,608	5,971.51	.622
Oakland st., Belmont ave. to Dickinson st..	838	2,782	1,708.92	.611
Orleans st., State st. to Pendleton ave.....	1,509	4,293	1,888.13	.447
Pecousic ave., South st. to South st.....	2,205	7,350	5,605.27	.763
Pleasant st., State to Bay st.....	428	1,026	469.38	.457
½Princeton st., St. James ave. to Bay st....	1,509	6,329	2,992.06	.473
Ringgold st., North to Chestnut st.....	730	2,432	1,010.96	.415
Rutland ave., State st. to Wilbraham rd. ...	277	926	341.22	.368
Spruce st., Central to Florence st.....	699	1,737	805.28	.464
*St. James ave., extension to new bridge over N. Y., N. H. & H. R. R.....	30	123		....
Thompson st., Bay to Worthington st.....	1,337	4,128	1,896.79	.459
§Wason ave., N. Main st. to B. & M. R. R.	505	1,718	1,003.18	.583
Waverly st., N. Main to North st.....	400	1,333	751.34	.564
Webster st., Liberty to Franklin st.....	606	2,020	1,009.51	.500
Wilbraham rd., Westford ave. to e. line Homer st.....	973	3,686	2,093.50	.568
Yale st., Dartmouth to Princeton st.....	863	2,886	1,157.15	.401
Total.....	33,236	104,259	\$56,233.88	

* Macadam laid by N. Y., N. H. & H. R. R. Co.

§ Does not include macadam in car tracks and 18" outside.

**STREETS ACCEPTED AS PUBLIC WAYS DURING THE YEAR
ENDING DECEMBER 10, 1903.**

NAME AND LOCATION.	Length in Feet.	Width in Feet.
Agawam st., Pecousic ave. to South st.	194	80
Burr st., Cambridge st. to Oak Grove ave.	380	40
Commonwealth ave., Belmont ave. to Washington st.	1,430	50
Fairbanks pl., Worthington to Alert st.	243	40
Heywood st., Warwick to Liberty st.	250	49
Jackson st., Sumner ave. to Maplewood ter.	283	60
King st., Logan st. to Westford ave.	889	49.5
Norfolk st., Wilbraham road southerly,	1,475	60
Pecousic ave., South st. to South st.	2,200	50
Total length	7,344	

**STREETS RELOCATED DURING THE YEAR ENDING
DECEMBER 10, 1903.**

NAME AND LOCATION.	Length in Feet.	Width in Feet.
Carew st., portions between Liberty st. and St. James ave.	3,600	66
High st., Maple to Walnut st.	2,600	33 to 40
North Main st., west line, opposite Morgan st.	436	
St. James ave., Highland branch N. Y., N. H. & H. R. R. to B. & A. R. R.	1,666	66
Worcester st., I. O., at Athol branch R. R. crossing.	3,010	60

BRICK SEWER CONSTRUCTION FOR 1903.

STREET AND LOCATION.	Size and Shape.	Length in ft.	Total cost.	Cost per ft.	Average cut in ft.	Materials Excavated.
Binnie ave., south from Douglas st..	1'-10" x 2'-9" Egg shape.	372.9	\$1,319.73	\$3.54	9.4	Clay.
Plainfield st., Newland to Roseland st.....	2'-4" x 3'-6" 2'-2" x 3'-3" Egg shape.	287.2 293.6	4,477.61	7.70	11.4	Fine blue sand, and water.
State st., Dwight st. easterly.....	2'-8" x 4'-0" 2'-2" x 3'-3" 2'-0" x 3'-0" Elliptical.	28.7 265.5 416.7	4,897.66	6.90	11.7	Marl, sand, water.
Sumner ave., extension east of White st.....	2'-2" x 3'-3" Egg shape.	564.8	2,391.46	4.25	11.7	Sand.
Worthington st., reconstruction, Bow- doin to Thompson st.....	3'-4" x 7'-2" 3'-4" x 6'-8" Egg shape.	358.8 441.9	3,908.81	4.88	14.	Sand.
Total.....		3,030.1	\$16,995.27			

PIPE SEWER CONSTRUCTION FOR 1903.

STREET AND LOCATION.	Size of Pipe.					Total length in ft.	Total cost.	Cost per lin. ft.	Materials required per lin. ft.	Materials excavated.
	24"	20"	18"	15"	12"					
Armory st., south from Springfield st....	...	31.5	146.0	...	...	177.5	\$317.00	\$1.79	9.7	Sand.
Birnie ave., south from Thomas st....	...	812.4	816.0	...	...	628.4	768.74	1.22	7.4	Clay.
Card Factory Pond, State st. to High sch.	88.2	...	...	...	...	88.2	192.34	2.18	7.5	Sandy loam.
Carew st., east from Armory st....	1101.0	448.0	767.46	.50	6.5	Sand.
*Cemetery Brook, east from Morris st...	174.6	...	...	...	...	1549.0	184.73	1.06	...	Sandy loam.
Central st., east and west from Maple st.	769.1	...	...	769.1	1,211.68	1.58	5.7	Sandy loam.
Chestnut st., south from Carew st....	126.0	100.68	.80	6.0	Loam.
Chestnut st., south from Douglas st....	449.8	385.61	.78	7.2	Loam.
Congress st., east from Garden Brook...	...	183.0	198.5	369.3	248.1	...	1,463.00	1.46	8.1	Black loam.
Cumberland st., west from Chestnut st...	167.5	...	125.20	.75	4.2	Clay'y loam.
Fairbanks pl., north from Worthington st.	248.8	...	220.66	.88	6.5	Sandy loam.
Franklin st., east from Cass st....	620.9	...	684.92	.90	7.8	Clay.
§Franklin st., (rel'g) west from Tracy ave.	86.7	...	...	108.38	1.24	9.0	Clay.
Huntington st., east from Birnie ave....	300.0	...	416.95	.69	6.0	Loam, fill'g.
Medford st., east from Birnie ave....	280.0	513.8	349.25	.68	4.0	Clay.
Patton st., east from Garden Brook...	351.8	349.0	536.7	1237.5	1,526.49	1.24	8.8	Black loam.
Portland st., east from Birnie ave....	251.5	...	476.0	.70	6.7	Clay, filling.
*Raymond ave., north from Carew st....	276.7	...	...	...	6.0	Sand.
*Roseland st., west from Plainfield st....	350.0	349.5	173.0	872.5	940.28	...	8.6	Fine Sand, Water.
Silver st., east from Armory st....	302.2	297.5	599.7	449.50	.75	8.0	Sand.
Thomas st., east from Birnie ave....	451.2	...	338.41	.75	7.8	Fine loam.
Tracy ave., south from Franklin st....	13.5	...	15.48	1.08	7.5	Clay.
Total.....						11,186.8	\$10,898.54			

*Not completed Dec. 10, total cost not returned.
 §Used 1.8 ft. of original cement pipe.

PIPE SEWERS BUILT BY PRIVATE PARTIES.

STREET AND LOCATION.	Size of Pipe.		Length in Feet.	Materials Excavated.
	12"	10"		
Irvington ave., south from Sumner ave....	300.5	100.0	400.5	Sand
Randolph st., east from Maplewood ter....	249.6	251.4	501.0	Sand
Tracy ave., south from Franklin st.....	.....	262.5	262.5	Clay
Total.....	.....	.....	1,164.0	.....

SEWERS NOT PREVIOUSLY REPORTED.

STREET AND LOCATION.	Size of Pipe.			Length in Feet.	Material.	Cost.
	18"	12"	10"			
Central st., westerly from from Sterns terrace .....	.....	105.0	.....	105.0	Clay	\$199 95
*Maple st., southerly from Central st.....	33.0	338.0	.....	371.0	Cement	160 95
Wolcott st., westerly from Armory st.....	.....	.....	220.0	220.0	Clay	.....
Total.....	.....	.....	.....	696.0	.....	.....

* Cost originally reported under Central street, 1881.

COST OF SEWER SYSTEM.

Total amount expended on account of Sewers and Drains to December 10, 1903:

1863-1880 inclusive	\$395,342 10	1893.....	\$35,857 56
1881	48,809 76	1894.....	37,710 58
1882	35,020 74	1895.....	34,126 83
1883	33,588 60	1896.....	59,057 20
1884	42,077 98	1897.....	46,675 42
1885	36,078 01	1898.....	59,543 29
1886	30,569 91	1899.....	62,674 06
1887	40,050 95	1900.....	155,295 45
1888	38,450 33	1901.....	95,564 02
1889	34,142 92	1902.....	55,458 59
1890	36,650 90	1903.....	43,353 52
1891	96,444 59		
1892	73,390 00	Total amount to date..	\$1,626,033 31

COMPARISON OF BIDS FOR BUILDING PLAINFIELD STREET SEWER.

	FRED T. LEY & CO.		CURTIS & MALONEY.	
	Price per cu. yd.	Total.	Price per cu. yd.	Total.
Earth Excavation, 1490 cu. yds....	\$1 50	\$2,235 00	\$1 50	\$2,235 00
Brick Masonry, Portland, 21 cu. yds.	12 50	262 50	14 00	294 00
" " Rosendale, 139 cu. yds.	12 00	1,668 00	12 00	1,668 00
8" Underdrain, 580 lin. ft.....	45	261 00	50	290 00
Total.....	.....	4,426 50	.....	4,487 00

All bids rejected and sewer built by day labor.

COMPARISON OF BIDS FOR GRANITE CURBING, 1903,
Delivered on the cars at Springfield.

BIDDER'S NAME AND ADDRESS.	Price per Lineal Foot.	
	4"	6"
*Benvenue Granite Quarries, Middletown, Conn.....	\$0 35	\$0 45
The Haddam Granite Co., Middletown, Conn.....	37	54
A. Dickinson, Shailerville, Conn.....	38	54
William N. Flynt Granite Co., Monson, Mass.....	50	60
John Frawley, Wendell Depot, Mass.....	52	62
The Webb Granite & Construction Co., Worcester, Mass..	52	61

* Awarded the contract.

***PRECIPITATION FOR CALENDAR YEAR, 1903.**

Month.	Total in Inches.	Greatest Amt. in 24 hrs. Inches.	Dates.	Storms in which the Precipitation exceeded $\frac{1}{4}$ inch per hour.	Max. Rate per Hour. Inches.	Duration of Max. Rate. Minutes.
Jan.	3.29	1.53	21	May 28, .5 inches in 1 hour.	1.2	10
Feb.	3.84	1.09	4	June 9, .6 " " "	1.2	15
Mar.	5.08	1.84	23	" 29, .1 " " "	.6	10
April	1.74	.98	7 & 8	" 30, .1 " " "	.7	10
May	.83	.65	28	July 6, .2 " " "	1.0	10
June	8.33	2.78	20 & 21	" 20, .4 " " "	1.4	15
July	4.68	1.84	5 & 6	" 21, .3 " " "	1.5	10
Aug.	6.13	1.91	4 & 5	" 22, .8 " " "	3.0	10
Sept.	2.73	1.54	16	Aug. 6, .1 " " "	.6	10
Oct.	2.27	.92	17 & 18	" 25, .6 " " "	2.0	15
Nov.	2.63	1.25	16 & 17	Sept. 5, .6 " " "	.9	10
Dec.	2.36	1.00	20 & 21	" 16, 1.5 " " "	.6	130

Total. 43.91

*Includes rain, hail, sleet, and melted snow.

Number of days in which the precipitation exceeded .01 inch,	110
Number of days during which snow fell,	16
Date of last snowfall in the spring,	March 17
Date of first snowfall in the fall,	November 16
Highest river, and date,	17.4', March 25
Lowest river, and date,	3.1', September 6
Annual range of river,	14.3'
Mean daily height of river,	5.74'
Greatest 24-hour rise, and date,	6.5', June 21
Greatest 24-hour fall, and date,	2.4', " 23

GENERAL STATISTICS.

CITY OF SPRINGFIELD, MASS., DECEMBER 10, 1903.

Springfield is situated on the east bank of the Connecticut river, in latitude $42^{\circ} 06'$ north, longitude $72^{\circ} 35'$ west, at an elevation above sea level of from 65 to over 215 feet.

State street, at corner of Main street, is 65.9 feet above sea level.

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner avenue, at corner of Belmont avenue, is 187.9 feet above sea level.

Population, estimated,	66,446
Number of voters : men, 11,960 ; women, 263 ; total,	12,223
Number of polls,	19,618
School enrollment : public, 12,568 ; parochial, 1,638 ; total,	14,206
Greatest extent of city, north and south,	5.9 miles
Greatest extent of city, east and west,	8.9 miles
Connecticut river frontage,	4.65 miles
Area, including those portions covered by water, approximately,	24,661 acres

Area by wards : Ward One, 1,733.6 acres ; Two, 225.7 acres ; Three, 234.8 acres ; Four, 413.2 acres ; Five, 400.6 acres ; Six, 327.4 acres ; Seven, 2,197.7 acres ; Eight, 19,128.3 acres.

Total park areas, 501.36 acres ; Forest Park, 463.24 acres.

Area taxed, 16,185 acres : tax rate, \$14.60 per \$1,000.

Valuation.	Real estate,	860,787,130	}	. \$77,207,898
	Personal,	15,263,190		
	Resident Bank shares,	1,157,578		
Public streets accepted to Dec. 10, 1903,	141.65 miles.	{	Wood block,	.28 miles
			Granite block,	2.40 miles
			*Vitrified brick,	3.47 miles
			Sheet asphalt,	.44 miles
			Macadam,	49.87 miles
			Gravel or dirt,	86.02 miles
			*Catskill block,	.27 miles
Sidewalks laid in public streets to Dec. 10, 1903,				144.38 miles
Electric railways (double track counted twice),				48.29 miles

* Does not include brick pavement in railway tracks on Belmont avenue and White street, and around Court square.

Steam railroads,	{	Four tracks, about	4.5 miles
		Double tracks, about	7. miles
		Single track, about	11. miles
Water mains,			147.34 miles
Gas mains, about			107. miles
Sewers 99.30 miles,	{	Brick sewers,	24.13 miles
		Vitrified clay pipe,	44.20 miles
		Cement pipe,	27.87 miles
		Wood pipe, . . . . .	.04 miles
		Cast iron pipe, . . . . .	.20 miles
		Brick and stone,	2.85 miles
		Concrete syphon, . . . . .	.01 miles
Street lights, arc,	922	Engine houses,	12
Street lights, incandescent,	45	Steam fire engines,	6
Houses,	11,025	Spare engines,	1
Schoolhouses,	34	Chemical engine and hose wagons,	13
Churches,	48	Ladder trucks,	3
Post offices,	4	Aerial trucks,	2
Police stations,	2	Water towers,	1
Railroad stations,	7		

CITY EXPENDITURES.

City engineer's department,		\$11,724 83
Fire department,		115,117 66
Forestry,		9,201 85
Street department, {	Maintenance,	\$118,267 47
	Paving,	15,272 91
	Macadam and gravel,	61,767 79
	Sidewalks and curbing,	29,004 66
		224,312 83
Sewer department,		41,920 23
Police department,		86,032 64
Public parks,		30,008 53
Street lighting department,		74,082 69
Water department,		142,864 10
School department,		262,024 65
Pauper department,		54,854 02
Scavenger department,		13,271 69
Collection of ashes,		16,011 94

Annual Report
City Engineer

Springfield, Massachusetts



For the Year 1914

CITY OF SPRINGFIELD

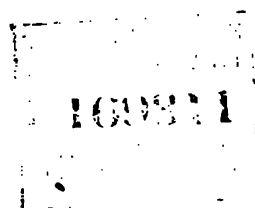
MASSACHUSETTS

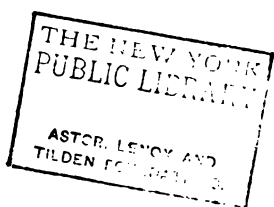
COMPLIMENTS OF

CHARLES M. SLOCUM

City Engineer

1904







MATINE, SURINAME

REPORT OF THE CITY ENGINEER.

CITY OF SPRINGFIELD, MASS., December 27, 1904.

To the City Council:—

The report of the operations of the Engineering Department for the fiscal year ending December 10, 1904, is herewith respectfully submitted.

FINANCIAL STATEMENT.

RECEIPTS.

Annual appropriation for the year 1904, . . .	\$11,300 00	
Receipts from other city departments, . . .	1,502 05	
	<hr/>	\$12,802 05

EXPENDITURES.

Salaries of City Engineer and assistants, . . .	\$9,989 25	
Office rent and lighting,	520 55	
Drawing materials, stationery and general supplies, . . .	805 07	
Car fares, telephone, and general office expenses, . . .	410 99	
	<hr/>	\$11,725 86
Balance unexpended,		<hr/> \$1,076 19

DESCRIPTION OF EXPENDITURES.

ENGINEERING DEPARTMENT.

For all services performed on account of matters referred to the Board of Public Works by the City Council relating to the laying out or alteration of streets, sidewalks, sewers, and parks; for surveys and levels, plans and profiles, estimates of cost, releases from damages, reports to the City Council, and

general correspondence relating to matters referred to the Board, and all clerical work performed relating to public hearings and all meetings of the Board; measuring and assigning house numbers, work upon house number books and records and making new plans; furnishing street lines and grades to individuals for buildings, grading, fencing, and sidewalk construction; surveys, estimates, and all general services performed for the various committees of the City Council; general map, plan, and profile drawing of streets, sewers, and public property for office records and for future reference; measuring and recording all sewer connections for house drains, and furnishing lines and grades; preparation of plans for the City Solicitor's use and attendance at court; indexing plans and other records; photographing and blue-printing, examination of deed records, setting of street monuments, and all other services not charged to other city departments, the sum of \$8,487.20

HIGHWAY DEPARTMENT.

For all services performed on account of and charged to the street work appropriation; estimates and plans, lines and grades for paving, macadam and gravel, inspection of contract work, final measurements, and all other incidental work, the sum of \$450.80

SIDEWALK AND CURBING DEPARTMENT.

For all services performed for the general sidewalk and curbing appropriation; lines and grades for laying out and construction, measurements for assessments, and all work incidental thereto, the sum of \$176.81

SEWER DEPARTMENT.

For all services performed on account of the general sewer appropriations; plans, estimates, borings, laying out of work and general supervision of construction details, and all other incidental work, the sum of \$451.92

WATER DEPARTMENT.

For all services performed for the Water Department; surveying, giving line and grade for pipe at Van Horn reservoir; cross sections near Five Mile pond; soundings at Belchertown reservoir; map of city showing water mains; survey levels and plans in connection with improvements at Ludlow, and all incidental work, the sum of \$340.68

CITY PROPERTY COMMITTEE.

For all services performed for the City Property Committee; plans, cross-section levels and test pits at site of new Technical High School, the sum of \$13.31

PARK DEPARTMENT.

For all services performed for the Park Department; surveys in vicinity of Court Square extension, and all incidental work, the sum of \$22.57

FORESTRY DEPARTMENT.

For services performed for the Forestry Department; tracings of street plans, the sum of \$2.62

SCHOOL DEPARTMENT.

For all services performed for the School Department; looking up deeds and survey of Worthington Street schoolhouse lot, the survey and cross-section levels of White Street schoolhouse lot, the sum of \$27.19

FIRE DEPARTMENT.

For services performed for the Fire Department; survey of Hooker Street engine house lot, the sum of \$12.00

SPRINGFIELD STREET RAILWAY CO.

Paving grades on Chestnut street, the sum of \$3.00

AMERICAN TELEPHONE AND TELEGRAPH CO.

Running line of Carew street, the sum of . . . \$1.15

GENERAL WORK OF THE DEPARTMENT.

NEW PAVING.

The new paving laid during the year consists for the most part of "Creo-Resinate" wood blocks, laid in Main street between Hampden and Worthington streets on the north, and State street on the south. There is considerable demand for this kind of pavement on account of its comparative freedom from noise and rough and uneven surface.

The old granite block pavement, removed where the new wood blocks were laid, laid between the years 1887 and 1890, was very rough and noisy, having been taken up and relaid for the most part to accommodate the various underground operations prosecuted since the laying of the granite pavement, resulting in a very unsatisfactory surface. Moreover, the pavement was laid on a sand foundation without a concrete base, which renders the replacing of a pavement, when taken up in part, very difficult.

The wood blocks laid were furnished by the United States Wood Preserving Company and had a depth of $3\frac{1}{2}$ inches, a width of 3 inches, and a length of 8 inches. The blocks were of long leaf Georgia pine and subjected to the same chemical treatment, substantially, as those furnished in recent years.

The entire pavement was laid on a $4\frac{1}{2}$ inch concrete foundation, with a cushion coat of cement mortar on top $\frac{1}{2}$ inch in depth on which the blocks were laid.

The thickness of the concrete base is less than that employed heretofore in our city for such work, and time and use must demonstrate its sufficiency. However, there has been a tendency during more recent years to reduce the thickness of the



MAPLE STREET
REPLACING PAVEMENT, SHOWING THE WOOD BLOCKS ON EITHER SIDE OF THE CAR RAIL.

concrete foundation for paving work, since the more extended use of Portland cement for this class of work.

The concrete base was made with Hudson Portland cement one part, sand three parts, crushed trap rock six parts; the cushion coat, of Hudson Portland cement one part, sand four parts.

The wood blocks when laid were flushed over with Portland cement grout, made one part Portland cement, and two parts sand, which was well brushed into the joints between the wood blocks.

The wood blocks, after laying and before the grouting was performed, were rolled to a uniform surface with a light weight steam roller, which gave quite satisfactory results.

There is a considerable demand for the wood form of pavement on business streets because of its freedom from noise, thereby contributing to convenience in the performance of business. It is expected that a considerable further demand for the wood blocks will be made, especially on business streets where granite block pavement is now laid.

It may not be demonstrated that the wood blocks are as economical for maintenance as some other forms of paving materials, but the public convenience should be fully considered and met in the consideration of the proper paving materials that should be employed. This may at times involve such first cost, and expense for maintenance, that a luxury is introduced.

The element of noise may not demand so much consideration in future paving operations when less noisy vehicles are employed.

All work of wood paving has been performed by the Street Department and its regular employees rather than by contract, and it is fully believed that this method insures superior results in quality of workmanship.

11,981 square yards of wood block pavement, at a cost of \$41,975.23, or \$3.50 per square yard, has been laid during the

season. The cost of wood blocks delivered on cars in Springfield was \$2.05 per square yard.

GRANITE BLOCK PAVING.

Some of the granite blocks removed from Main street, where the new wood blocks were laid, were laid in Cypress street, the street having been paved its entire length between Main and Fulton streets. Cypress street having much heavy traffic from the freight house of the Boston and Maine railroad, the blocks were laid on a sand bed, and amounted to 1,700 square yards.

No granite blocks have been purchased for paving purposes for many years, as this form of pavement has proved so unpopular with the public by reason of its noise and roughness.

BITULITHIC PAVEMENT.

The city has for some time considered the use of Warren Brothers' Bitulithic pavement, but has delayed the matter until the present year for a more complete demonstration of the value of this material. Its general use has now become so extended that there is good opportunity for passing judgment upon its general merits.

Its extended use generally throughout the United States has shown that it has most of the desired qualities for a modern, improved pavement, and combines freedom from noise with sufficient smoothness of surface, cleanliness, and cheapness of first cost. It is also believed that the cost of maintenance will not be found excessive.

Maple street from High to Central, Taylor street from Main to Dwight street, and Hampden street for a distance of 212 feet west of Main street, have been paved with this material, making a total of 9,066 square yards. The work was performed by contract with the Warren Brothers, who are specially equipped for this kind of work, furnishing their own bituminous material as well as special machinery.



Maple street has a single line street railway track and a 30-foot roadway. The other two streets have no street car tracks, but are subject to considerable traffic of a business character.

The success of this form of pavement depends greatly upon the bituminous product entering into it, and the Messrs. Warren Brothers have special apparatus designed for the proper distillation of coal tar products. Their large knowledge and experience especially equip them for this work.

The cost of the bitulithic pavement was \$2.00 per square yard, which includes the cost of excavation and preparation of roadbed.

Tables are appended to this report showing the cost and amount of the various paving materials laid during the year.

SEWERAGE.

The usual amount of attention has been given to the extension of the sewerage system, and the replacing of some sewers of unsatisfactory operation.

Owing to the very unusually liberal plan upon which the public sewers are laid in this city, there is but small hesitation on the part of those desiring extension of new work to petition for the same, and their wishes are generally met.

There is no doubt that our system of assessments is defective and most unusual as compared with other cities, and a study of the methods employed in other places would doubtless lead to a revision of our method, and a more just plan of assessment.

MILL RIVER VALLEY INTERCEPTING SEWER.

Owing to the prolonged delay in the spring and early summer in passing the order for the construction of this sewer, and the issue of bonds to cover the cost of construction, the work was not begun until August 12, a contract having been awarded to

Daniel J. Curtis of this city for the three sections of this work, the entire length of sewer being 4,509 lineal feet.

It was anticipated that some difficulty would be met in constructing this sewer, owing to its considerable depth below the ground surface and the water level of Watershops pond, also from its near location to the pond. The westerly part of section one was executed after many delays in starting, without much difficulty, as only a very small amount of ground water was encountered, which came mostly from the direction opposite the pond; a close retentive strata of clay was found in lower part of the trench on this section of the work, which aided greatly in excluding the water from the trench.

In excavating for the easterly part of this section of the sewer, a very fine yellow sand was encountered, yielding a considerable quantity of water, requiring a large pumping plant to free the trench from water. This section was completed to the New York, New Haven and Hartford railroad embankment and then terminated for the winter.

The coming season will complete the section under the railroad embankment, which is to be passed through by tunneling methods, the depth below railroad track being about 43 feet.

Section two was started at the east side of the railroad embankment during November and prosecuted until freezing weather, a distance of about 500 feet having been covered.

The shallow part, or the easterly end of section three, was started late in the season, and a length of about 1,100 feet laid, completing this section of number three to its most easterly point in Hickory street at Gunn brook. No connection has been made as yet between the sewer and brook, the sewer being unfinished and therefore unable to carry the flow of the brook.

One of the main objects of the construction of the sewer was the diversion of the flow from the Gunn brook, which now discharges into the Watershops pond, in order that no pollution might result to the ice supply.

WORTHINGTON STREET SEWER.

The work of enlarging the sewer in Worthington street, between Bowdoin street and St. James avenue, started in 1903 and carried as far as Ingersoll Grove street, was completed in the early part of the year. The old arch to the sewer was removed and the side walls carried up 21 inches, after which a new arch was laid, making the height of the sewer 6 feet 9 inches. This alteration it is expected will result in relieving this section of the Worthington street sewer in times of heavy storms, but the full benefits of the improvements for the vicinity will not be reached until the sewer through Dartmouth street is also enlarged in a similar manner.

CENTRAL STREET SEWER.

The old cement pipe sewer laid in Central street between Mill River canal and Spruce street many years ago, was found during the year to be worn through on the bottom to such an extent that considerable difficulty was experienced in keeping the street surface over the sewer in safe and convenient condition.

It was therefore decided that the sewer should be relaid. Investigation showed that the old dimensions of the sewer were inadequate to provide for all the storm water discharged from the district tributary. It was found that a small brick sewer should be laid with dimensions of 2'—0" x 3'—0" between Mill River Valley intercepting sewer and Hancock street; from Hancock to Spruce street a 20-inch pipe was found sufficient.

A 24-inch storm water overflow was provided between Mill River canal and the new intercepting sewer in Mill street, laid down a steep incline. A 10-inch pipe was laid from the bottom of the brick sewer and connecting with the intercepting sewer to provide for the ordinary sewage flow.

Although late in the season when this work was ordered, its construction was carried out between Mill river and Hancock

street, a small quantity of rock being encountered in the bottom of the trench.

WORCESTER STREET, INDIAN ORCHARD, SEWER.

In connection with the erection and operation of the new Fiberloid plant at Indian Orchard has arisen a demand for tenement houses in the vicinity of Worcester street to provide for the company's employees. Several new buildings are now being erected on Holly street near Worcester street, and it was found that the present sewer in Worcester street, laid as far as Chestnut street, should be extended westerly to Holly street in order to provide for the new tenement houses. An order was passed for this sewer which is now being laid, the materials being brick, and having dimensions of 1'—10" x 2'—9".

An order has recently been passed for a pipe sewer in Holly street to extend from the sewer in Worcester street to Hampden street.

PIPE SEWERS.

The usual construction of pipe sewers has been carried out during the year, and a table is submitted with this report, showing all sewer construction during the year and its cost.

STREETS ACCEPTED AND RELOCATED.

There has been laid out 11,138 lineal feet of new streets as public ways, a table of which will be found with this report, showing length and width.

The Wilbraham road has been relocated at the Carlisle brook, and a small strip of land on the northerly side has been discontinued.

HICKORY STREET.

A large amount of time has been expended by the Department in preparing the necessary plans and surveys, releases and agreements, as well as estimates of cost, for the proposed widen-

ing and relocation of Hickory street from the Young Men's Christian Association Training School and extending easterly around on the northerly shore of Watershops pond to the Wilbraham road.

The plan involved the widening from a width of 49½ feet to a width of 100 feet. There was also considerable straightening by introducing curves where numerous angles existed in the old location.

Releases for the land needed for the widening were obtained from most of the owners of adjoining lands on favorable conditions, several of the abutters giving the land outright for the improvement.

The report of the Board of Public Works upon this matter was submitted early in the summer season, but as yet has received no final action by the City Council.

The widening and relocation of this street is much desired as a parkway, and would make a very valuable addition to the city's park system, constituting, from its location bordering on the north shore of Watershops pond, one of the finest and most picturesque drives to be found in the city.

It is desirable that some action should be taken in this matter soon, as much of the land is unimproved and can now be obtained at small cost.

The report of the Board of Public Works involved the grading for present needs of a 30-foot roadway and the setting out of shade trees and shrubs, such as would make a fair beginning, leaving for the future the further expenditure of means necessary for the final improvement.

BIRNIE AVENUE EXTENSION.

The Board of Public Works now have under consideration a petition for the continuation of Birnie avenue southerly from Thomas street, over Round Hill to a connection with Plainfield street at Fulton street, thereby making another through thor-

oughfare of travel extending from Brightwood southerly to Cypress street and generally parallel to Main street.

The most difficult feature of this improvement is the location over Round Hill, plans for which are now being made in order that the feasibility of this scheme may be determined.

TOWN BOUNDARIES.

The Selectmen of Wilbraham have been conferred with in relation to the town boundary line between Springfield and Wilbraham, it having been ascertained from a survey made in 1903 that the existing monuments at all intermediate highway crossings are not in a straight line drawn from the monuments placed at the ends of the line, some of the monuments having been found to be about one rod to the west of the line, and all the monuments standing on the Springfield side of the line.

The Wilbraham authorities advised that by joint action of the two contiguous towns in 1830 the monuments were placed in their present location, and the records of the transaction show that the monuments should not be changed without authority from the General Court.

The matter was referred to the Massachusetts Town Boundary Survey Commission to ascertain what action was taken and what conclusions were reached in making their recent surveys and atlas, copies of which have been furnished to the various towns.

The matter was referred to the Attorney-General for an opinion, who advised that in the original setting off of Wilbraham, the line was made straight, also that in all subsequent perambulations the line had been described as straight, and that the joint action of the towns in 1830 was taken without legislative authority, and consequently was illegal. He further advised that the monuments be placed on the straight line.

The opinion of the Attorney-General was referred to the

City Solicitor, who, after examination of the matter, concurred in the conclusion reached.

The Selectmen of Wilbraham have been notified of the legal opinions above referred to, and it is expected that they will be willing to join in the correct replacing of the monuments.

BOARD OF PUBLIC WORKS.

The usual attention has been given to the various requests of the Board of Public Works, who, acting in their advisory capacity only, require considerable service in attendance at hearings and office meetings and keeping a record of the same. The Department is also required to make all surveys, plans and profiles, and estimates for the board, as well as to prepare all releases and special agreements and final reports.

Forty-four hearings and office meetings of the board have been attended.

RECODIFICATION OF CITY ORDINANCES.

At the request of the Committee on City Ordinances a draught has been made for a recodification of the existing ordinances relating to the duties of the City Engineering Department.

DEPARTMENT ASSISTANTS.

The regular force of assistants employed has been as follows: Principal assistant, Walter A. Brown; instrumentmen and draughtsmen, Herbert E. Flint, Charles A. L. Wright, Edward G. Martin, Ernest F. Young; rodmen and draughtsmen, Charles J. Hancock, Harold T. Murphy, Orrin F. Cooley, John D. Williams; stenographer and typewriter, Edith I. Gibbins.

There have also been temporarily employed as rodmen, Arthur P. Slocum and Fred L. Hunn.

Respectfully submitted,

CHARLES M. SLOCUM,

City Engineer.

BOARD OF ALDERMEN, December 27, 1904.

Read, accepted, ordered printed, and sent down for concurrence.

E. A. NEWELL, *Clerk.*

COMMON COUNCIL, December 27, 1904.

Read and concurred.

H. S. GILBERT, *Clerk.*

Presented to the Mayor for approval, December 28, 1904.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, SPRINGFIELD, MASS., December 28, 1904.

Approved.

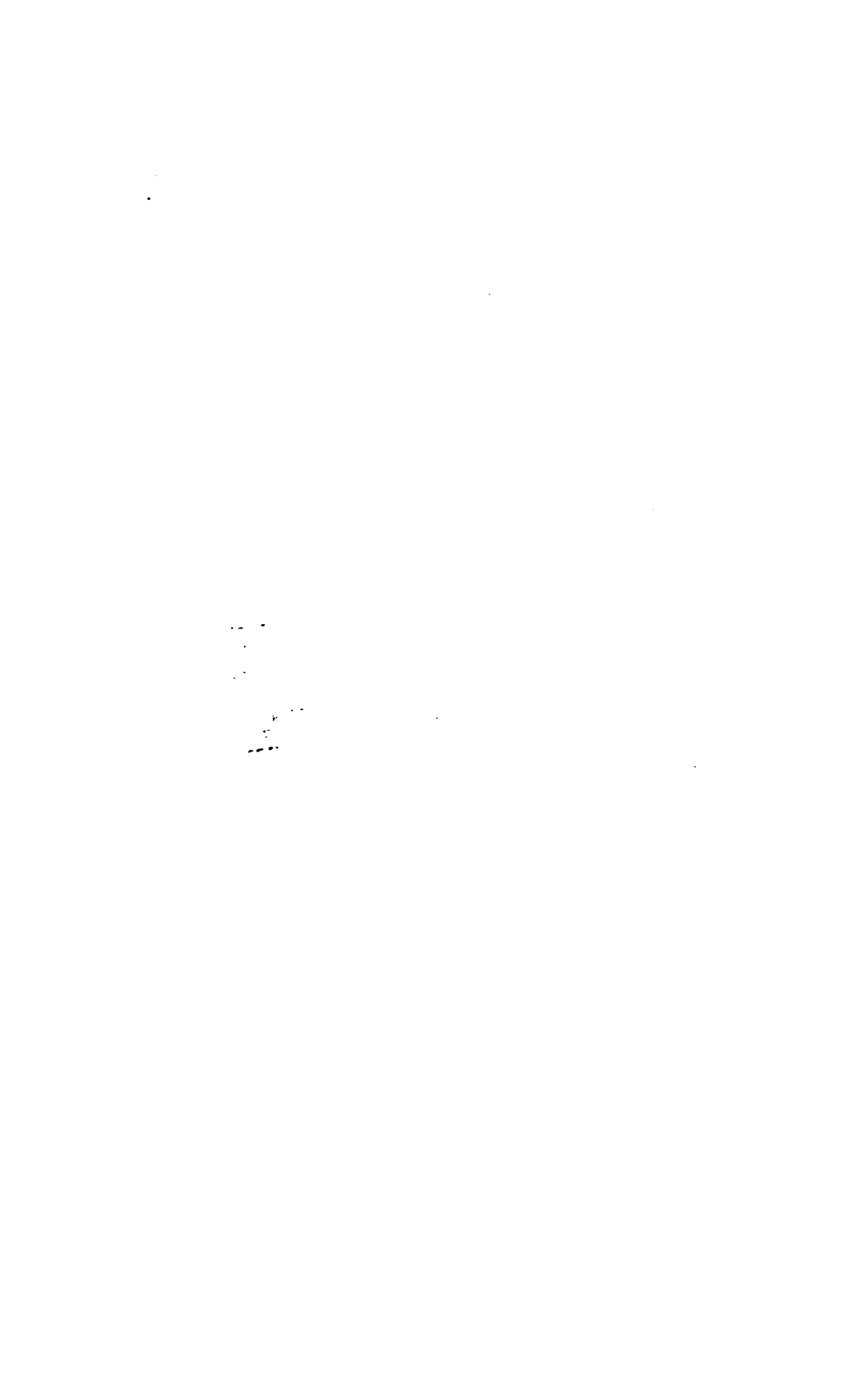
E. E. STONE, *Mayor.*



SOUTH END BRIDGE,
SHOWING METHOD OF RAISING, 1903.



SOUTH END BRIDGE,
SHOWING METHOD OF RAISING, 1903.



PAVING LAID IN 1904.

LOCATION.	Material.	Foundation.	Length in Feet.	Area in Square Yards.	Cost.	Cost per Square Yard.
Cypress st., Main st. to point 19 ft. east of Granite blocks.....	.....	Sand	459	1,700	\$1,200 87	\$0 70
Boylston st. ....	.....	.....	.....	.....	.....	.....
Hampden st., Main st. westerly	Bitulithic (Warren's)	Old macadam	312	821	1,693 04	2 08
Main st., north line of Hampden to south line of Worthington st. (west side)	Creo-resinate wood block, (8" x 8" x 3 1/2")	4 1/2" concrete and 1/2" mortar	384	.....	.....	.....
Main st., south line of Worthington to south line of State st.	Creo-resinate wood blocks, (8" x 8" x 3 1/2")	4 1/2" concrete and 1/2" mortar	1,899	11,981	41,975 23	3 50
Main st., at south line of State st.	Syracuse brick (3 1/4" x 7 1/2" x 3 1/2")	4 1/2" concrete and 1/2" mortar	6	40	97 60	2 44
Maple st., north line of High to south line of Central st.	Bitulithic (Warren's)	Old macadam	1,563	5,665	12,479 82	2 20
Taylor st., Main to Dwight st.	Bitulithic (Warren's)	Old macadam	770	2,580	5,298 01	2 01

Contract price of bitulithic pavement, \$2.00 per square yard.

PAVEMENTS SUPERSEDED BY OTHER MATERIALS, 1904.

LOCATION.	Material Removed.	Length in Feet.	Area in Square Yards.
Main st., north line of Hampden to south line of Worthington st., (west side)	Granite block	384	} 11,981
Main st., south line of Worthington to south line of State st.	Granite block	1,899	
Main st., at south line of State st.	Granite block	6	

LENGTH AND AREA OF STREETS PAVED TO DECEMBER 10, 1904.

LOCATION.	Date of Laying.	Length in Feet.	Area in Sq. Yds.	Kind of Pavement.
Belmont ave., 400' east of Woodside ave., to Hall st., in car tracks	1901	1,362	1,211	Catskill block
" " Hall to Oakland st., in car tracks	1903	1,023	914	Metropolitan block
Bridge st., Main to Dwight st.	1900	688	2,525	Rock asphalt
Catharine st., State to Bay st.	1900	1,722	5,691	Syracuse brick
Charles st., Liberty st. to land of B. & A. railroad	1903	150	376	Granite block
" " Chestnut st., Worthington to Lyman st.	1895	472	1,673	" "
" " Lyman st. to B. & A. railroad	1889	256	1,471	" "
" " B. & A. railroad to Linden st.	1892	1,640	5,235	" "
" " Linden to Carew st.	1893	773	2,156	" "
" " Carew to Allendale st.	1900	1,015	3,432	Syracuse brick
Court st., Court Square ave. to Main st.	1897	317	1,277	Rock asphalt
" " " " easterly, in car tracks	1897		174	Syracuse brick
" " Square ave., Court to Elm st.	1897	193	503	Rock asphalt
" " " " " in car tracks	1897		380	Syracuse brick
Cypress st., Main to near Boylston st.	1904	459	1,700	Granite block
Dwight st., State to Lyman st.	1896	2,324	9,905	Syracuse brick
East Court st., Main to Market st.	1900	117	297	Rock asphalt
Elm st., Court Square ave. to Main st.	1897	343	949	" "
" " " " easterly, in car tracks	1897		330	Syracuse brick
Fort st., Water to Main st.	1895	670	1,770	Granite block
Hampden st., Main st. westerly	1904	213	821	Bitulithic
Harrison ave., Main to Dwight st.	1896	586	2,247	Trinidad asphalt
Liberty st., Chestnut to Cass st.	1900	1,399	4,571	Syracuse brick
" " Cass st. to Heywood ave.	1901	1,147	3,971	" "
Lyman st., Main to Chestnut st.	1889	1,305	4,599	Granite block
Main st., Locust to Marble st.	1897	840	4,381	Syracuse brick
" " Marble to William st.	1896	1,762	8,307	" "
" " William to Bliss st.	1893	1,148	5,475	Granite block
" " Bliss to State st.	1893	241	1,355	Syracuse brick
" " State to Worthington st.	1904	1,899	10,798	Wood block (8" x 3 1/2" x 8")
" " Worthington to Hampden (west side)	1904	382	1,183	" "
" " " " (east side)	1903		962	" (4" x 4" x 8")
" " Hampden to Lyman st.	1903	153	775	" "
" " Lyman to Liberty st.	1903	484	2,780	Grooved wood block " "

LOCATION.	Date of Laying.	Length In Feet.	Area In Sq. Yds.	Kind of Pavement.
Main st., Liberty to Sharon st. (east side)	1903	458	1,135	Wood block (4" x 4" x 8")
" " " Cypress st. (west side)	1890	(270)	880	Granite block
" " " Cypress to Sharon st. (west side)	1890	(183)	580	" "
" " Sharon to near Franklin st.	1891	545	2,920	" "
" " near Franklin to Carew st. (east side)	1897	1,302	4,606	Syracuse brick
" " Emery to Sargeant st. west side)	1901	1,447	5,449	Catskill block
" " Crossing opposite Auburn st.	1903		163	" and Metropolitan block
Maple st., High to Central st.	1904	1,563	5,665	Bitulithic
Plainfield st., s. line of Sargeant to Fulton st.	1902	1,710	10,249	Syracuse brick
Sanford st., Main to Market st.	1900	102	207	Rock asphalt
State st., Main st. to City Library	1890	1,019	4,034	Granite block
" " Dwight to Chestnut st. (widened)	1896		217	" "
" " Walnut to Oak st.	1897	847	4,590	Syracuse brick
Summer st., Autumn st. to near Kibbe ave.	1895	1,259	4,029	Granite block
" " Kibbe ave. to near Federal st.	1901	787	2,695	" "
Taylor st., Main to Dwight st.	1904	770	2,580	Bitulithic
Walnut st., State to Union st.	1899	688	2,144	Syracuse brick
" " Union st. to Pendleton ave.	1900	873	3,140	" "
White st., Allen to Orange st. in car tracks	1902	1,610	2,400	" "
Worthington st., Main to Dwight st.	1896	739	2,544	" "
" " Dwight st. to Fairbanks place.	1901	1,060	3,869	" "
" " Fairbanks place to Spring st.	1903	260	1,003	" "
Total		42,075.	159,182.	

The wood blocks laid in 1904 are on 5" concrete and mortar base; the granite blocks are laid in sand, and all other pavements on 6" concrete base with 1" sand cushion.

RECAPITULATION.

Material.	Length In Feet.	Area In Square Yards.	Material.	Length In Feet.	Area In Square Yards.
Wood block	3,371	17,693	Catskill block	2,809	6,823
Granite block	10,483	39,750	Metropolitan block	1,023	914
Syracuse brick	19,498	76,991	Bitulithic	2,545	9,066
Rock asphalt	1,760	5,758			
Trinidad asphalt	586	2,247	Total	42,075	159,182

STREETS MACADAMIZED IN 1904.

STREET AND LOCATION.	Length in ft.	Area in sq. yds.	Cost.	Cost per sq. yd.
Bay st., Catharine to Princeton st. (between rails)	(968)	506	Laid by St.	Ry. Co.
Central st., Mill to Hancock st. (between rails and 18" outside)	(540)	480	" "	" "
Dorchester st., St. James ave. to Amherst st.	567	1,887	\$947.33	\$0.502
Douglas st., N. Main st. to Birnie ave.	540	1,800	844.47	.469
*Gray's ave., Cypress to Emery st.	560	1,900	575.07	.442
Harvard st., St. James ave. to Cornell st.	682	2,273	1,108.05	.487
§High st., Maple to Walnut st.	2,563	5,544	3,299.33	.595
Huntington st., N. Main to Becket st.	643	2,143	Laid by W.	H. Dexter
Ingraham ave., High to Union st.	258	462	153.86	.333
Lafayette st., St. James ave. to Amherst st.	568	1,865	934.06	.501
†Maple st., State to High st. (widened) ...		328	1,332.96	
N. Main st., Carew st. to 350' N. of Wason ave. (between rails and 18" outside) ..	(6,295)	12,112	Laid by St.	Ry. Co.
Quincy st., Oak to Hancock st.	1,359	3,878	2,165.60	.558
Stebbins st., Quincy to Union st.	186	621	368.56	.593
Tyler st., Oak to Hancock st.	1,346	4,002	2,349.81	.587
Westminster st., State st. to St. James ave.	1,911	6,388	3,225.64	.505
Totals	11,183	45,589	\$17,303.74	

* Part old material used.

§ Includes cost of cobble gutters.

† Includes cost of reconstructing walks, etc.

STREETS ACCEPTED AS PUBLIC WAYS DURING THE YEAR
ENDING DECEMBER 10, 1904.

NAME AND LOCATION.	Length in Feet.	Width in Feet.
Andrew st., Burr to Dawes st.	308	50
Birnie ave., Thomas st. to Wason ave.	2,273	60
Clark st., Spruce to Hancock st.	613	25
Franklin st., Nursery to Genesee st.	625	50
Genesee st., Liberty to Franklin st.	270	50
Horace st., Dickinson to Orange st.	770	50
Huntington st., N. Main to Becket st.	643	50
Lenox st., Sumner ave. to Forest Park	450	40
Marengo Park, Belmont ave. to Dickinson st.	1,330	60
Prospect st., Massasoit to Carew st.	800	66
Revere st., White to Orange st.	1,310	50
Warwick st., Heywood st. to Taber-Prang Co.'s east line..	811	40
Woodside ter. (Columbus av.), Forest Park av. to Belmont av.	460	50
" " (Woodside av.), Belmont av. easterly	475	49.5
Total length	11,188	
Wilbraham road, relocated at Carlisle brook	1,002	66

BRICK SEWER CONSTRUCTION, 1904.

STREET AND LOCATION.	Size and Shape.	Length in ft.	Total Cost.	Cost per lin. ft.	Average cut in ft.	Materials Excavated.
Central st., Mill to Hancock st. (relaying)	2'-0" x 3'-0" Egg shape.	596.7	\$ 2,115.29	3.54	9.0	Sand, rock
*Mill river intercepting sewer, Hick- ory st. easterly to railroad	2'-2" x 3'-3" Egg shape.	968.0	20,573.14		20.0	Rock, red gravel, sand and water
†Railroad easterly to Hickory st.	" " "	1,441.0			10.0	Sand, gravel and water
Worthington street, reconstruction, Thompson st. to St. James ave.	3'-4" x 6'-9" Egg shape.	864.5	4,243.46	4.90	14.0	Sand
Total		3,870.2	\$26,931.89			

* Not completed, total cost not shown.

† Not connected with sewer system.

PIPE SEWER CONSTRUCTION FOR 1904.

STREET AND LOCATION.	Size in inches.				Total Length in ft.	Total Cost.	Cost per lin. ft.	No. of manholes	Materials Excavated.
	24	18"	15"	12"					
Armory street, north from Carew st....					283.4	\$107.71	\$0.38	7.0	Sand
Berkshire st., I.O., east from Oak st....				325.7	325.7	805.51	.94	7.0	" and gravel
Central st., Mill st. to Mill river	39.6				39.6	186.83	3.45		Sandy loam
*Greenwich st., Becket to N. Main st..				300.0	300.1	316.31		5.5	" " filling
Grenada ter., east from Dickinson st....			219.5	310.0	529.5	708.45	1.34	10.0	Sand
Gordon st., Pasadena ave. to White st.				617.6	617.6	555.79	.90	8.0	"
High st., east from Maple st. (relaying)			522.7	567.0	1089.5	1,986.92	1.19	7.8	"
Johnson st., extension to Pasadena ave.			1468.0		1468.0	2,723.69	1.85	8.5	"
Liberty st., near Main st. (relaying) ...					118.2	179.19	1.52	8.7	Clayey loam
Maple st., Park to High st.			224.8		224.8	505.21	2.25	8.7	Sand and loam
" " State to Temple st.			314.9		314.9	675.51	2.15	12.0	"
Myrtle st., I.O., South from Hampshire					126.0	100.99	.80	7.5	" and gravel
Norfolk st., south from Wilbraham rd.			299.5	300.4	599.9	566.08	.94	7.0	"
Oakland st., north from Dickinson st. . .	254.4	350.9		169.5	774.8	1,619.20	2.09	14.5	"
Ormand st., Belmont to Sumner ave.					275.0	252.85	.92	7.0	"
Park st., Willow to Maple st. (relaying)	200.0	556.8			756.8	1,431.05	1.89	8.5	Loam, muck, water
Peabody lane, west from Willow st....					215.5	284.47	1.09	8.0	Loam and muck
Pomona ave., north from Sumner ave..				580.0	580.0	459.94	.79	9.5	Sand
Private way, Ferry to Liberty st.....				210.4	210.4	402.70	1.91	10.5	Clayey loam
Temple st., east from Maple st.....			40.0		40.0	34.79	.87	11.0	Sand
Walden st., east from Dickinson st....					166.0	76.92	.47	7.5	"
*White st., south from Gordon st.				691.0	691.0	458.44	.66		"
Wilmont st., extension to Ranney st....			450.6	386.2	836.8	947.88	1.13	11.8	"
Worthington st., Kibbe ave. to Federal st. (relaying)			794.0		794.0	826.90	1.04	9.0	Sandy loam
Total					12,227.5	15,588.83			

* Not completed December 10, total cost not shown.

COST OF SEWER SYSTEM.

Total amount expended on account of Sewers and Drains to December 10, 1904 :

1863-1880 inclusive.	\$395,342 10	1883	\$35,857 56
1881	48,809 76	1894	37,710 58
1882	35,020 74	1895	34,126 83
1883	33,588 60	1896	59,057 20
1884	42,077 98	1897	46,675 42
1885	36,078 01	1898	59,543 29
1886	30,569 91	1899	62,674 06
1887	40,050 95	1900	155,295 45
1888	38,450 33	1901	95,564 02
1889	34,142 92	1902	55,458 59
1890	36,650 90	1903	43,353 52
1891	96,444 59	1904	45,887 13
1892	73,390 00		

Total amount to date\$1,671,820 44

COMPARISON OF BIDS FOR
BUILDING MILL RIVER VALLEY INTERCEPTING SEWER.

	* D.J.Curtis.	Michael Maloney.	Seymour, Clark, Hills Co.	Fred T. Ley & Co.
4,810 cu. yds. earth excavation, section 1	\$ 1 75	\$ 2 37	\$ 2 30	\$ 2 20
6,680 cu. yds. earth excavation, section 2	1 35	2 00	1 85	2 00
4,340 cu. yds. earth excavation, section 3	1 25	1 85	1 85	2 00
251 cu. yds. rock excavation	3 00	5 25	4 50	4 25
85 lin. ft. tunnel	20 00	17 50	18 00	20 00
144 cu. yds. brick masonry, Portland	15 00	14 00	12 50	13 50
1,077 cu. yds. brick masonry, Rosendale	12 00	11 00	12 50	12 50
4,509 lin. ft. 8" underdrain	50	35	50	40
Totals	\$42,827 00	\$51,272 10	\$51,856 50	\$52,818 85

* Awarded the contract.

The contract for furnishing GRANITE CURBING during the year was awarded to The Wm. N. Flynt Granite Co. of Monson, Mass., at \$0.45 per lineal foot for 4-inch curb, and \$0.50 per lineal foot for 6-inch, delivered on the cars at Springfield.

The contract for SIDEWALK CONSTRUCTION was awarded John W. Rochford, who laid about 1,200 square yards of coal tar concrete walk, at \$0.64, about 475 square yards of tar concrete, skim-coat, at \$0.35, and about 650 square yards of cement concrete walk, at \$1.60 per square yard.

*PRECIPITATION FOR CALENDAR YEAR, 1904.

Month.	Total in Inches.	Greatest Amount in 24 hrs. Inches.	Dates.	Storms in which the Precipitation exceeded $\frac{1}{4}$ inch per hour.	Max. Rate per Hour. Inches.	Duration of Max. Rate. Minutes.
Jan.	2.20	.74	22 & 23	June 5, .23 inches in 1 hour.	.69	20
Feb.	2.29	.92	22	July 1, .27 " " "	1.08	15
Mar.	3.83	2.21	7 & 8	" 18, .28 " " "	.98	10
April	3.23	1.37	27 & 28	" 31, .62 " " "	2.40	15
May	2.14	.69	9	Aug. 1, 2.78 " " "	5.40	2
June	2.11	.52	29	" 8, .50 " " "	.60	20
July	3.02	.85	1	Sept. 3, .20 " " "	1.90	5
Aug.	7.22	4.04	1 & 2	" 8, .32 " " "	2.40	5
Sept.	6.01	4.00	14 & 15	" 12, .10 " " "	.80	5
Oct.	2.17	1.41	21	" 14, 2.00 " " "	2.40	30
Nov.	1.13	1.08	13	Oct. 21, .40 " " "	1.20	20
Dec.	1.77	.88	27			
Total	39.12					

* Includes rain, hail, sleet and melted snow.

Number of days in which the precipitation exceeded .01 inch,	123
Number of days during which snow fell,	28
Date of last snowfall in the spring,	April 16
Date of first snowfall in the fall,	November 13
Highest river, and date,	15.3', March 28
Lowest river, and date,	2.9', July 30
Annual range of river,	12.4'
Mean daily height of river,	5.4'
Greatest 24-hour rise, and date,	3.2', March 28
Greatest 24-hour fall, and date,	2.9', " 29

GENERAL STATISTICS.

CITY OF SPRINGFIELD, MASS., DECEMBER 10, 1904.

Springfield is situated on the east bank of the Connecticut river, in latitude 42° 06' north, longitude 72° 35' west, at an elevation above sea level of from 65 to over 215 feet.

State street, at corner of Main street, is 65.9 feet above sea level.

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner avenue, at corner of Belmont avenue, is 187.9 feet above sea level.

Population, estimated,	68,417
Number of voters: men, 13,169; women, 467; total,	13,636
Number of polls,	20,176
School enrollment: public, 12,842; parochial, 1,755; total,	14,597
Greatest extent of city, north and south,	5.9 miles
Greatest extent of city, east and west,	8.9 miles
Connecticut river frontage,	4.65 miles

Area, including those portions covered by water, approximately, 24,661 acres

Area by wards: Ward One, 1,733.6 acres; Two, 225.7 acres; Three, 234.8 acres; Four, 413.2 acres; Five, 400.6 acres; Six, 327.4 acres; Seven, 2,197.7 acres; Eight, 19,128.3 acres.

Total park areas, 499.14 acres; Forest Park, 464.24 acres.

Area taxed, 16,185 acres; tax rate, \$14.60 per \$1,000.

Valuation,	Real estate,	\$62,145,950	}	\$78,868,058
	Personal,	15,569,370		
	Resident Bank shares,	1,152,738		

Public streets accepted to Dec. 10, 1904,	}	144.45 miles.	Wood block,	.64 miles
			Granite block,	1.99 miles
			*Syracuse brick,	3.70 miles
			Sheet asphalt,	.44 miles
			Catskill block,	.53 miles
			Metropolitan block,	.19 miles
			Bitulithic,	.48 miles
			Macadam,	51.28 miles
			Gravel or dirt,	85.2 miles

Sidewalks laid in public streets to Dec. 10, 1904, 146.96 miles

Electric railways (double track counted twice), 48.29 miles

*Does not include brick pavement in railway tracks around Court Square.

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PAVING LAID IN 1904.

LOCATION.	Material.	Foundation.	Length in Feet.	Area in Square Yards.	Cost.	Cost per Square Yard.
Cypress st., Main st. to point 19 ft. east of Granite blocks.....	Granite blocks.....	Sand	459	1,700	\$1,200 87	\$0 70
Boyiston st.	Bitulithic (Warren's)	Old macadam	212	821	1,698 04	2 08
Hampden st., Main st. westerly.....	Creo-resinate wood block, (8" x 8" x 3 1/4")	4 1/2" concrete and 1/2" mortar	384			
Main st., north line of Hampden to south line of Worthington st. (west side)	Creo-resinate wood blocks, (8" x 8" x 3 1/4")	4 1/2" concrete and 1/2" mortar	1,899	11,981	41,975 23	3 50
Main st., south line of Worthington to south line of State st.	Creo-resinate wood blocks, (8" x 8" x 3 1/4")	4 1/2" concrete and 1/2" mortar	6	40	97 60	2 44
Main st., at south line of State st.	Syracuse brick (2 1/4" x 7 1/2" x 3 1/2")	4 1/2" concrete and 1/2" mortar	1,563	5,665	12,479 82	2 20
Maple st., north line of High to south line of Bitulithic (Warren's)	Bitulithic (Warren's)	Old macadam	770	2,580	5,293 01	2 01
Central st.	Bitulithic (Warren's)	Old macadam				
Taylor st., Main to Dwight st.	Bitulithic (Warren's)	Old macadam				

Contract price of bitulithic pavement, \$2.00 per square yard.

PAVEMENTS SUPERSEDED BY OTHER MATERIALS, 1904.

LOCATION.	Material Removed.	Length in Feet.	Area in Square Yards.
Main st., north line of Hampden to south line of Worthington st., (west side)	Granite block	384	} 11,981
Main st., south line of Worthington to south line of State st.	Granite block	1,899	
Main st., at south line of State st.	Granite block	6	

structing of other public works delegated to or undertaken by this department, and shall, either by himself or his assistants, make such surveys, plans, profiles, estimates and descriptions as may be required of him by the Mayor and Aldermen, the City Council or any committee thereof, and the City Solicitor, and he shall perform all such other services for the city which properly come under the direction of a civil engineer, as may be required of him by the Mayor, Board of Aldermen, City Council, or any committee thereof, the City Solicitor, or Board of Water Commissioners.

SECT. 5. He may, from time to time, employ such assistants as he shall require in the performance of his duties, and shall determine their compensation, in accordance, however, with the ordinances of the city and within the appropriation for said department, and subject to the approval of the Board of Supervisors. He may expend such sums for materials or incidental expenses as may be necessary; provided, however, that all such expenditures for employment of assistants and for materials and other incidentals, shall be limited to the amount actually appropriated by the City Council for the Engineering Department, and shall be subject to the approval of said Board of Supervisors.

SECT. 6. Unless otherwise specially provided, he shall take charge of the construction of all public works of the city which properly come under the direction of a civil engineer; shall perform all engineering services and make all examinations and prepare all statements, plans, specifications and contracts which any department may need in the discharge of its duties; shall supervise all repairs on the bridges used as highways, which affect the safety of the structure, and when required by the Mayor, or by any officer or board in charge of a department, shall measure the work done by contract for the city, and certify to the results of such measurements, and perform such other services as may be required.

SECT. 7. Whenever he shall ascertain that any building or structure has been placed within the lines of a public street, or so that it may cause injury thereto or inconvenience to travelers thereon, he shall immediately give notice thereof, in writing, to the Mayor.

SECT. 8. He shall annually, or oftener, if required by the Board of Supervisors, carefully examine all bridges within the city limits, and make such reports to said board respecting their condition as to safety, need of renewal or repairs, as the case may require.

SECT. 9. It shall be the duty of the City Engineer to assign numbers to all tenements and buildings on streets in the City of Springfield, except the sparsely settled portions thereof. Said numbers shall each cover a frontage of twenty feet, more or less, at the discretion of the City Engineer, and be measured continuously from end to end of the street, with the odd numbers on the southerly and easterly sides, and the even numbers on the northerly and westerly sides of all streets, so far as practicable. On any streets already wholly or partially numbered, said City Engineer shall assign such numbers as he shall deem best to correspond with the majority of numbers already in use on said street; he shall also assign a new number wherever he finds that the number in use fails thus to correspond, but he shall not have authority to renumber a street unless such renumbering is ordered by the Mayor and Aldermen.

SECT. 10. The Mayor and Aldermen may order a street renumbered whenever they deem it necessary.

SECT. 11. The owner and occupant of every tenement and building situated within the limits prescribed, shall cause to be placed and maintained on or over the outside doors fronting the street, or on front corners of every tenement or building having their entrances on the sides thereof, such number or numbers as may be assigned thereto by the City Engineer, under any of the provisions of this chapter, said numbers or figures not to be less

than three inches in height, and to be so placed as to be easily observed from the street in front of the premises.

SECT. 12. Whoever shall refuse or neglect to comply with the provisions of this chapter within thirty days after a notice in writing delivered to the owner or occupant of such tenement or building of the number or numbers so assigned by the City Engineer, shall, for each and every offense, forfeit and pay a penalty of not less than two nor more than twenty dollars.

SECT. 13. If the owner or occupant of any tenement or building fails to number the same in accordance with the provisions of this chapter, it shall be the duty of the City Engineer, or his authorized agent, to place the proper number or numbers thereon, and the cost thereof may be assessed by the Mayor and Aldermen upon said owner or occupant.

SECT. 14. The City Engineer shall keep a suitable record in his office of all numbering.

SECT. 15. The City Engineer shall annually, in the month of December, present to the City Council a report in relation to his department, showing the number of persons employed, the detailed expenses of the department, the general nature of the work, the property under his charge, the condition of all structures that come under his supervision that are in process of construction, or that have been completed during the previous year, and such other general information in relation to the same, as he may deem expedient, or as said Board of Supervisors may require.

CHAPTER 23.—BOARD OF PUBLIC WORKS.

SECTION 5. The City Engineer shall be the clerk of said board. He shall make and keep a record of the doings of said board, and certify the same when there is occasion therefor. He shall also make all plans and surveys required for the use of said board. In case of the absence or inability of said clerk to act, said board may appoint a temporary clerk to act in his

place, who shall receive for his services such compensation as said board shall determine.

CHAPTER 31.—DILAPIDATED OR DANGEROUS BUILDINGS.

SECTION 6. If such owner, agent or person interested in such unsafe structure refuses or neglects to comply with the requirements of such notice within the time limited, and such structure is not secured or taken down as therein ordered, a careful survey of the premises shall be made by a board consisting, in a city, of the City Engineer, the Chief Engineer of the Fire Department, and one disinterested person, to be appointed by said inspector, and in a town, of a surveyor, the Chief Engineer of the Fire Department, and one disinterested person, to be appointed by said inspector. If there is no City Engineer in such city or no Chief Engineer of the Fire Department in such city or town, the Mayor and Aldermen, or Selectmen, as the case may be, shall designate one or more officers or other suitable persons in place of the officers so named as members of said board. A report of such survey shall be made in writing and a copy thereof served on such owner, agent or any interested person.

CHAPTER 34.—PROVIDING THE MANNER OF LAYING OUT, ALTERING, AND DISCONTINUING STREETS; OF LAYING OUT AND ESTABLISHING SIDEWALKS; OF LAYING SEWERS AND DRAINS, .
AND FOR OTHER PURPOSES.

SECTION 9. No street or way shall be hereafter laid out, established or accepted as a public street of a less width than 50 feet, unless the same was actually constructed previous to April 1, 1902.

SECT. 10. No street or way constructed on private lands after September 16, 1902, shall be laid out, established or accepted as a public street or recommended for such acceptance as a public street, unless previously constructed and completed in accordance with the following specifications:—

SECT. 11. No street or way, constructed after January 1, 1902, on private lands, shall be laid out, established or accepted as a public street by the City of Springfield, unless the location, direction and grade of such proposed street shall have been determined by the Board of Public Works, previous to the construction of said street.

A. A plan and profile showing the location and grade of every street or way which it is proposed to lay out and establish as a public street shall be filed with the Board of Public Works by the corporation or individual proposing to open said street, at the time of laying out as a private way and before the same is graded or improved. Such plan and profile shall be drawn to such scale as may be required by the City Engineer, and to his approval, and shall show the location and grade of all connecting streets.

B. Every such street or way shall be constructed not less than fifty feet in width, and shall have a roadway of not less than thirty feet in width, and shall be of such cross section as the City Engineer may prescribe.

C. The entire area of every such street or way shall be cleared of stumps, rocks, roots and other unnecessary material, and of all trees not intended for preservation.

D. All clay, loam and loamy material shall be removed from the limits of the roadway and of the sidewalks, to such a depth as may be approved by the City Engineer, and shall be deposited outside the limits of such streets.

E. All work in excavation and embankment shall be brought accurately to a sub-grade, of not less than six inches for the roadway and twelve inches for the sidewalk below the finished grade. All side slopes in excavation and on adjoining land shall be at a ratio to be furnished by the City Engineer.

F. All rocks and boulders in excavation shall be removed from the street or used in the embankment. All embankments shall be made of loam, clean sand, gravel, cinders, furnace slag,

rock or broken stone only. Under no circumstances shall any perishable material be used for the making of streets or street embankments.

G. A good binding gravel or three grades of macadam, as may be approved by the Board of Public Works, shall be laid above the sub-grade on the roadway and to the finished grade, and clean sand, or such other materials as may be designated by the said board, shall be laid on the sidewalks above the sub-grade and paved to the finished grade with such materials as may be designated by the said board. The tree belt and side slopes adjoining or near the street line shall be covered with good loam at least eight inches in depth and so applied as to insure against slipping.

H. The said board may, at its discretion, designate such quality, length, depth and thickness of curbing as in its opinion may be necessary to be laid on every such street.

I. The side gutters on every street having a grade of two per cent. or more shall be paved at least three feet wide with stone, concrete or other suitable material as may be approved by the City Engineer.

J. Every street having a continuous grade for more than three hundred feet shall have catch basins and grates at such locations and of such quality, kind and dimensions, and so connected with the permanent drainage outlet, as may be approved by the City Engineer.

K. All corners of intersecting streets shall be rounded, and granite bounds shall be set at all angles, curves and corners of connecting streets by the owners of abutting land, and at their expense, according to the approval and direction of the City Engineer.

CHAPTER 36.—SEWERS AND DRAINS.

SECTION 4. The Superintendent of Sewers shall build or lay all common sewers or drains to the grade determined by the

direction and grade of such proposed street shall have been determined by the board of public works, previous to the construction of said street.

SEC. 12. No street or way shall hereafter be laid out, established or accepted as a public street in the City of Springfield unless the sewer or drain therein is constructed in accordance with the directions of, or is approved by, the board of public works in regard to the dimensions, materials and grade thereof.

SEC. 13. The name avenue shall be given only to the longer and more important streets of the city. All narrow passageways less than twenty-five feet in width shall be called lanes or alleys according to fitness; the longer and more important of them shall be called lanes, and the shorter and less dignified ones shall be called alleys. All blind or dead end streets or passageways shall be known as places or courts.

CHAPTER 36.—SEWERS.

SECTION 4. The Superintendent of Sewers shall build or lay all common sewers or drains to the grade determined by the City Engineer, and before connecting any private drain with any main drain or sewer he shall notify the City Engineer of his intention so to do, and of the time when he will have the same in proper condition for the necessary measurements to be taken to locate the connection; and it shall be the duty of the City Engineer to take said measurements so as not to hinder the work.

SECT. 7. The City Engineer shall furnish the Superintendent of Sewers with suitable information of the proposed grade of sewers at points not over fifty feet apart on the line of the sewers.

SECT. 8. The City Engineer, whenever any common sewer is built, shall make a plan of the same, showing the form, mode of construction, depth below the surface, relation of the grade line to the city base, and the general direction of the sewer

relatively to the street lines or neighboring property; and insert said plan in a book to be kept in his office for that purpose; and shall also minute on said plans all entries into any common sewer of which a plan exists.

SECT. 10. All sewers and drains laid by private parties in any street, court or way, opened or proposed to be opened for public travel and accommodation, shall be the property of the city when connected with a public sewer, and no such sewer or drain shall hereafter be connected with a public sewer unless it be of such size, material, construction and depth, and in such location as the City Engineer may direct, so far as it is within the lines of such street, court or way; nor until the owners thereof shall, in writing, convey to the city exclusive control over the same with the right to enter such court, street or way, and dig up the same so far as necessary for repairing and controlling said sewer or drain, and making connections therewith.

Annual Report

City Engineer

Springfield

Mass.



For the Year 1905

CITY OF SPRINGFIELD

MASSACHUSETTS

REPORT OF

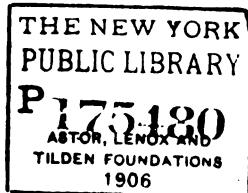
Compliments of

CHARLES M. SLOCUM

City Engineer

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REPORT OF THE CITY ENGINEER.

CITY OF SPRINGFIELD, MASS., December 27, 1905.

To the City Council:—

The report of the operations of the Engineering Department for the fiscal year ending December 10, 1905, is herewith respectfully submitted.

FINANCIAL STATEMENT.

RECEIPTS.

Annual appropriation for the year 1905, . . .	\$9,500 00	
Transferred from Sewers and Drains Account, . . .	500 00	
Receipts from other city departments, . . .	4,833 33	
		<hr/>
		\$14,833 33

EXPENDITURES.

Salaries of City Engineer and assistants, . . .	\$12,029 80	
Office rent and lighting,	554 24	
Drawing materials, stationery, and general supplies,	644 25	
Car fares, automobile service, and sundry office expenses,	1,286 98	
		<hr/>
		\$14,515 27
Balance unexpended,		\$318 06

DESCRIPTION OF EXPENDITURES.

ENGINEERING DEPARTMENT.

For all services performed on account of matters referred to the Board of Public Works by the City Council relating to the laying out or alteration of streets, sidewalks, sewers, and parks; for surveys and levels, plans and profiles, estimates of

cost, releases from damages, reports to the City Council, and general correspondence relating to matters referred to the Board, and all clerical work performed relating to public hearings and all meetings of the Board; measuring and assigning house numbers, work upon house number books and records and making new plans; furnishing street lines and grades to individuals for buildings, grading, fencing, and sidewalk construction; surveys, estimates, and all general services performed for the various committees of the City Council; general map, plan, and profile drawing of streets, sewers, and public property for office records and for future reference; measuring and recording all sewer connections for house drains, and furnishing lines and grades; preparation of plans for the City Solicitor's use and attendance at court; indexing plans and other records; photographing and blue-printing, examination of deed records, setting of street monuments, and all other services not charged to other city departments, the sum of \$7,316.83

HIGHWAY DEPARTMENT.

For all services performed on account of and charged to the street work appropriation; estimates and plans, lines and grades for paving, macadam and gravel, inspection of contract work, final measurements, and all other incidental work, the sum of \$377.46

SIDEWALK AND CURBING DEPARTMENT.

For all services performed for the general sidewalk and curbing appropriation; lines and grades for laying out and construction, measurements for assessments, and all work incidental thereto, the sum of \$740.21

SEWER DEPARTMENT.

For all services performed on account of the general sewer appropriations; plans, estimates, laying out of work and general supervision of construction details, and all other incidental work, the sum of \$737.34

WATER DEPARTMENT.

For all services performed for the Water Department; plans of water mains; locating pipe line at Loon pond, and all incidental work, the sum of \$131.91

ASSESSORS' DEPARTMENT.

Plans and surveys, the sum of \$2,710.59

PARK DEPARTMENT.

For all services performed for the Park Department; surveys of Court Square Extension, and all incidental work, the sum of \$7.00

FORESTRY DEPARTMENT.

For services performed for the Forestry Department; making tracing of portion of Union street, the sum of \$3.06

STREET LIGHTING DEPARTMENT.

Map of Indian Orchard, the sum of \$4.00

TECHNICAL HIGH SCHOOL BUILDING ACCOUNT.

For all services performed on account of the Technical High School building; making plan of lot, and giving line and grade for walks, the sum of \$39.21

WHITE STREET SCHOOLHOUSE ACCOUNT.

For services performed on account of the White Street schoolhouse; giving lines and grades for lot and walks, the sum of \$16.51

HOWARD STREET SCHOOLHOUSE ACCOUNT.

For all services performed on account of the Howard Street school building; survey of lot; staking out building; lines and grades and inspection for walks, the sum of \$36.80

SPRINGFIELD STREET RAILWAY COMPANY.

Giving grades for relaying tracks on State and Central streets, the sum of \$4.00

DANIEL W. MELLEEN.

Staking out Technical High School building, the sum of \$16.75

W. J. HYLAND.

Restoring angle in Dwight street, the sum of \$3.00

GENERAL WORK OF THE DEPARTMENT.

PAVING.

The paving laid during the year has been confined in the main to the "Bitulithic," so called, laid under the patent of Messrs. Warren Brothers. The pavement of this variety laid in 1904 was found very satisfactory, being smooth and yet not slippery, and comparatively noiseless. Also its cost is such as to put it on a very favorable basis as compared with other modern forms of pavement.

The bids received during the midsummer for "Bitulithic" and "Tar Macadam" pavements were all rejected, and it was decided to employ the necessary plant from the Messrs. Warren Brothers and perform the work by day's labor. The plant was located near the junction of the main line of the New York Central railroad and the Athol Branch railroad, a distance of about two and one half miles from Court Square.

The "Bitulithic" paving comprised the following named streets: Maple street, State to High street; Bridge street, Main street to Cook's alley; Worthington street, Main street to Cook's alley; Hampden street, Water street to the work laid in 1904; Chestnut street, Allendale street to Jefferson avenue; State street, Sherman street to Highland division of N. Y., N. H. & H. R. R.; Walnut street, Pine to Cedar street; a total of 18,371

square yards laid at a cost of \$37,633, or an average cost per square yard of \$2.05 which includes curb headers, inlet basins and excavation.

No wood pavement has been laid during the year, but the work of this kind laid in Main street in 1904 continues very satisfactory, being smooth, free from noise and easily cleaned.

Taking into consideration the qualities that should belong to a modern pavement, the "Bitulithic," and chemically treated wood block pavements merit popular favor.

Cypress street paving has been completed with granite blocks laid on a sand bed, the blocks used being old blocks removed from other streets where smoother forms of pavement have been laid.

SEWER CONSTRUCTION.

The largest and most important work of the year has been the completion of the Mill River Valley Intercepting sewer started in midsummer of 1904.

Operations were resumed in the month of May, the tunneling of the section under the Highland Division of the N.Y., N. H. & H. R. R. having been first undertaken.

The soil encountered in the west end of the tunnel was found difficult to handle for a few feet east of the westerly heading, and operations were started from the easterly heading. Here the ground was found more stable, containing some clay, and the tunnel was driven from the easterly heading by the usual timbering methods.

The constant running of a steam pump lowered the ground water sufficiently to assist greatly in the matter of drainage.

Work upon this sewer progressed steadily through the summer season, the contractor being considerably delayed from scarcity of labor, and its completion was reached in November.

A relocation of the line was made across a portion of the Training School property in order that the timber growth might not be interfered with, the Training School officials being spe-

cially desirous of saving all interference with the fine growth of trees, several of which would have been destroyed had the sewer been constructed on the location first designed.

The sewer was located adjacent to the shore of Massasoit lake, and in ground that would have been covered with water at full pond, but owing to the draught upon the pond for power at the United States Water Shops its level was lowered some three or four feet which enabled the construction of the sewer through the dry bed of the pond. The relocation greatly reduced the depth of cutting, there being barely depth enough to afford proper covering for the sewer.

It was anticipated that a large volume of water would be encountered on the relocated line coming from the pond side of the sewer trench. In construction it was found that the greater part of the water came from the land side of the trench and in sufficient quantity to require the constant running of a steam pump supplemented by the occasional use of hand pumps ahead of the masonry.

The length of this sewer was nearly one mile and for the most part constructed through sand, rather fine at the grade of the sewer, with an abundance of ground water.

Upon the completion of the work a connection was made with the channel of Gunn brook, formerly discharging into the Massasoit lake, so that at present the usual flow of the brook and its ordinary storm discharge is flowing through the new sewer.

Ultimately it will be necessary to separate the storm water from the ordinary or sewage flow as the new sewer was designed to receive the sewage only.

The completion of this sewer removes the principal danger to the pollution of the Massasoit lake and the ice supply which has long been regarded as a standing menace to the public health.

The total cost of the sewer was \$43,084.53 and affords an important advance toward the ultimate drainage of the territory drained by the Carlisle and Gunn brooks.

All other sewer construction has been carried out by the city under the usual plan of day's labor employed by the Sewer department, and under the general supervision of the Sewer and Engineering departments. This plan conduces to saving of cost and simplicity of administration, and has been followed for many years, demonstrating the wisdom of this method.

11,292.2 lineal feet of pipe sewers have been laid during the year, costing \$14,244.00.

2,756.4 lineal feet of brick sewers have been laid at a cost of \$25,216.44.

2,746 lineal feet of pipe sewers have been laid by private parties, the cost having been borne by them.

All sewers laid by private parties have been laid out and supervised by the Engineering department, the materials employed and the workmanship corresponding to the work done by the city.

SUBMERGED SEWER OUTLETS.

The submerged sewer outlets into Connecticut river constructed in 1896 require occasional attention, the Worthington street outlet having been three times obstructed since 1900. The Clinton street outlet has been once obstructed since its construction in 1899. As all the outlets receive the combined flow of storm water and sewage they are called on to discharge a large amount of sand, gravel, road detritus and in fact all materials that enter the sewer system through the street inlet basins, including occasional pieces of lumber.

In times of severe rainstorms there is frequently so much material of this kind carried by the excess of water that it clogs or chokes the submerged outlet. These stoppages for the most part can only be removed by a diver and occasion considerable expensive labor. Should these obstructions continue it would appear that suitable catchment basins should be constructed near the outlet to arrest the road materials and pieces of lumber that serve to obstruct the outlets.

These sewer outlets as first designed and constructed were made as simple as possible consistent with successful operation and reasonable cost of maintenance, their arrangement meeting the approval of the State Board of Health. At the time of their design there were no known works of this character to serve as a precedent, and the combined effects of the freshet discharge of Connecticut river and the operation of the sewers could not be fully determined in advance.

With the exception of these occasional obstructions these submerged outlets have shown good results and their ordinary operation has been attended by no cost.

The demand for the extension of the sewer system continues in the districts under development for real estate improvements.

Owing to the small cost of such works to the property owner by reason of the unusual and peculiar system of sewer assessment in vogue, there is little or no hesitation in petitioning for new sewers, the cost of which is in the main borne by the city, only twenty-five per cent of such cost being met by assessment on private property, a most unusual arrangement.

FLUSHING OF SEWERS.

This city has at present no automatic system of flushing for its sewer system, the sewer flushing being wholly performed by the opening of water gates connected with the upper end of lateral or pipe sewers.

The system employed has its advantages inasmuch as a large volume of water can be directed into the sewers at any time, but owing to the extent of the system, in most cases, many days must elapse between these periodical flushings.

Automatic flush gates are now most generally recommended and employed in the design of new sewer systems, it being considered a more sanitary arrangement to flush the sewers every day, or more often if desired, with a smaller volume of water discharged automatically than to flush after an interval of several days.

It is recommended that the automatic system be tried to a limited extent on some of the smaller pipe sewers in order that we may make a fair comparison as to cost and efficiency.

In a system of pipe sewers receiving sewage only without the admission of storm water there is no doubt of the superiority of the automatic system of flushing.

BUILDING ENCROACHMENTS IN PUBLIC STREETS.

The rather haphazard method of constructing building fronts near to and adjoining public streets, without any particular oversight on the part of the city has resulted in projecting bay windows, steps, and doorway entrances upon the domain laid out and dedicated to the public use. Many new buildings have projecting cornices that are within the limits of the public streets.

This practice should be prohibited at once and the use and occupation of the public highways confined strictly to the purposes for which they were laid out and dedicated.

BOARD OF PUBLIC WORKS.

The Board of Public Works has had the usual amount of petitions referred to it by the City Council for investigation and report, having held forty-two public hearings and office meetings.

The City Engineer acting under the ordinances as clerk and engineer for the Board has attended all hearings and meetings and the department has prepared all surveys, plans, profiles and estimates and reports upon the various matters reported to the City Council.

Nine new streets have been recommended for acceptance as public streets, including location and grade, having a total length of 5,633 lineal feet; six having a width of 50 feet, one

a width of 60 feet, one a width of 40 feet, and one a width varying from 33 to 41 feet.

Two streets have been relocated and seven streets have been reestablished and the boundary lines defined and monumented in accordance with present occupation and use.

The Board has also reported on many petitions for new sewers, also new sidewalks and curbing.

Several petitions are now under consideration by the Board but not yet reported upon for the reason that special considerations and agreements must be effected before these matters can be properly decided upon.

One of the more important matters now under consideration by the Board is the extension and widening of Pecousie avenue from Mill river to the junction of Longhill and South streets at Mr. E. H. Barney's residence. This project has for many years been under consideration and has been regarded by those having a large view of the city's future needs as one of the steps that must sooner or later be taken in order to make reasonable provision for the city's future welfare and growth.

The Board has also under consideration the laying out of a new street over Round Hill from Arch to Plainfield street and in extension of Birnie avenue, forming also a direct extension of Fulton street. This matter involves large property interests and a very considerable construction cost which is the main reason for the deferring of a report on this matter.

With this extension and the continuation of Water street under the Boston and Albany railroad between Railroad and Cypress streets, another through thoroughfare will be afforded from the south to the north end of the city.

It is time that the public were awakened to the urgent necessity for more than one continuous thoroughfare north and south through the business or commercial section of our city. This is imperative and should be met by prompt action.

It is now considered by all who have the city's best inter-

ests and growth at heart that the neglect to continue Dwight street northerly before the present conditions were brought about is a mistake that can only result in great future inconvenience to the public.

Some attention should be given the city's needs from an esthetic standpoint. There can be no doubt that reasonable provision for the laying out and establishment of a reasonable number of fine drives or parkways adjoining such beautiful sheets of water as our Massasoit lake would do much for the best cultivation of the public tastes and also afford great enjoyment. The cost of such improvement whether met by present or future payments could not be regarded by coming generations as involving other than the wisest and best economy.

The details for the laying out of a fine boulevard on the north shore of Massasoit lake in the locality of Hickory street were well worked out by the Board of Public Works in its report to the City Council made early in 1904, but not yet adopted.

The south shore of Massasoit lake is also susceptible to similar treatment and would add much to the enjoyment of the public and contribute greatly to the general desirability of the section for residential purposes.

Already public spirited property owners have volunteered generous action in the way of land contributions for both of these improvements.

A bridge of ornamental design can be constructed at small cost across the narrow portion of Massasoit lake that shall connect these avenues.

Is it wise that the development of the more beautiful sections of the city shall be so long deferred that the matter is prohibited by the action of individuals looking to the occupation of the ground by an inferior layout of streets and building sites?

The conservatism of the past should teach us something of real value in the way of showing us the necessity for prompt and thorough action in these and kindred matters.

PLANS OF THE CITY.

The disastrous City Hall fire resulted in a large loss of public records among which were the plans of private property throughout the city, in the custody of the assessors of taxes. They immediately asked for an appropriation for new plans and the Engineering department was requested to proceed immediately with the work. The sum of twenty-seven hundred dollars was expended during the winter and early summer and two hundred and twelve plans of uniform size, 20 x 26 inches, were prepared showing house lots and streets, drawn for the most part on a scale of 50 feet to an inch. Fifty of these plans were duplicates of plans on file at the City Engineer's office prepared at various times since 1874.

All the new plans prepared are to be duplicated for use in the City Engineer's office, an urgent necessity for which has long existed.

It is expected that the work will be extended the coming season to cover all the built up portions of the city, and when secured should thereafter be corrected from year to year to show all changes in boundary lines.

These plans are of great assistance not only to the Assessors' department but to the City Engineer's office as well.

DEPARTMENT EMPLOYEES.

The department force has continued in the main of the same personnel as in 1904.

Mr. Herbert E. Flint has been promoted to the position of Assistant Engineer.

The regular force comprised Assistant Engineers, Mr. Walter A. Brown and Mr. Herbert E. Flint. Messrs. Edward G. Martin, Chas. A. L. Wright and Ernest F. Young have been employed as instrument men. Messrs. Chas. J. Hancock, Harold T. Murphy, Orrin F. Cooley, John D. Williams and

Edward W. Burnett have been employed as rodmen and chainmen and have also performed considerable service as draughtsmen.

Miss Edith I. Gibbins has been employed as stenographer and in addition has performed a miscellaneous clerical service.

The opportunity is taken to acknowledge the coöperation of the various assistants employed and the courtesies extended by the other city departments and committees associated with the work.

Respectfully submitted,

CHARLES M. SLOCUM.

City Engineer.

BOARD OF ALDERMEN, December 28, 1905.

Read, accepted, ordered printed, and sent down for concurrence.

E. A. NEWELL, *Clerk.*

COMMON COUNCIL, December 28, 1905.

Read and concurred.

H. S. GILBERT. *Clerk.*

Presented to the Mayor for approval, December 30, 1905.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, SPRINGFIELD, MASS., December 30, 1905.
Approved.

FRANCKE W. DICKINSON, *Mayor.*

PAVING LAID IN 1905.

LOCATION.	Material.	Length in Feet.	Area in Sq. Yds.	*Cost per Sq. Yd.
Bridge st., Main st. to Springfield W. W. building.	Bitulithic	492.8	1,746	\$1 71
Chestnut st., Allendale st. to Jefferson ave.....	Bitulithic	825.5	2,898	2 09
Cypress st., Boylston to Fulton st.	Granite blocks	216.0	848	0 88
Hampden st., terminus of 1904 work to Water st.	Bitulithic	393.9	1,539	1 94
Maple st., State to High st.....	Bitulithic	592.5	2,530	2 07
State st., Sherman st. to railroad crossing	Bitulithic	820.5	4,352	2 17
Walnut st., Pendleton ave. to Lebanon st.....	Bitulithic	1,194.6	3,888	2 16
Worthington st., Main st. to Cook's alley.....	Bitulithic	404.4	1,418	1 77
Total.....	.....	4,940.2	19,219	.....

* These items include all labor and materials pertaining to the work except in the case of Cypress street where old granite blocks were used.

NOTE ON FOUNDATION: The granite blocks were laid on sand. The two-inch wearing surface of bitulithic rests on five inches of well rolled macadam.

Paving blocks were laid alongside of the rails where there were car tracks, two rows outside and one row inside of rails; granite blocks being used on Chestnut and State streets, wood blocks on Maple street and Johnsonburg paving brick on Walnut street. The blocks rest on a sand cushion and a six-inch concrete base, the concrete also being tamped under the rails between the ties to a depth of six inches.

LENGTH AND AREA OF STREETS PAVED TO DECEMBER 10, 1905.

LOCATION.	Date of Laying.	Length in Feet.	Area in Sq. Yds.	Kind of Pavement.
Belmont ave., 400' east of Woodside ave., to Hall st., in car tracks.	1901	1,362	1,211	Catskill block
" " Hall to Oakland st., in car tracks.	1903	1,023	914	Metropolitan block
Bridge st., Main to Dwight st.	1900	688	2,525	Rock asphalt
" " Springfield W. W. building to Main st.	1905	493	1,746	Bitulithic
Catharine st., State to Bay st.	1900	1,722	5,691	Syracuse brick
Charles st., Liberty st. to land of B. & A. railroad	1903	150	376	Granite block
Chestnut st., Worthington to Lyman st.	1895	472	1,678	" "
" " Lyman st. to B. & A. railroad.	1889	266	1,471	" "
" " B. & A. railroad to Linden st.	1892	1,640	5,235	" "
" " Linden to Carew st.	1893	778	2,156	" "
" " Carew to Allendale st.	1900	1,015	3,432	Syracuse brick
" " Allendale st. to Jefferson ave.	1905	825	2,898	Bitulithic
Court st., Court Square ave. to Main st.	1897	317	1,277	Rock asphalt
" " " " easterly, in car tracks	1897		174	Syracuse brick
" " Square ave., Court to Elm st.	1897	193	503	Rock asphalt
" " " " " " in car tracks.	1897		330	Syracuse brick
Cypress st., Main to near Boylston st.	1904	459	1,700	Granite block
" " near Boylston to Fulton st.	1905	216	848	" "
Dwight st., State to Lyman st.	1896	2,324	9,905	Syracuse brick
East Court st., Main to Market st.	1900	117	297	Rock asphalt
Elm st., Court Square ave. to Main st.	1897	343	949	" "
" " " " " " easterly, in car tracks	1897		330	Syracuse brick
Fort st., Water to Main st.	1895	670	1,770	Granite block
Hampden st., Main st. westerly	1904	212	821	Bitulithic
" " 212' west of Main to Water st.	1905	394	1,539	" "
Harrison ave., Main to Dwight st.	1896	586	2,247	Trinidad asphalt
Liberty st., Chestnut to Cass st.	1900	1,399	4,571	Syracuse brick
" " Cass st. to Heywood ave.	1901	1,147	3,971	" "
Lyman st., Main to Chestnut st.	1889	1,305	4,599	Granite block

LENGTH AND AREA OF STREETS PAVED TO DECEMBER 10, 1905.—Continued.

LOCATION.	Date of Laying.	Length in Feet.	Area in Sq. Yds.	Kind of Pavement.
Main st., Locust to Marble st.	1897	840	4,381	Syracuse brick
" " Marble to William st.	1896	1,762	8,307	"
" " William to Bliss st.	1893	1,148	5,475	Granite block
" " Bliss to State st.	1893	241	1,355	Syracuse brick
" " State to Worthington st.	1904	1,899	10,798	Wood block (3" x 3½" x 8")
" " Worthington to Hampden st. (west side)....	1904	382	1,183	" " " "
" " " " (east side).....	1903		962	" " (4" x 4" x 8")
" " Hampden to Lyman st.	1903	153	775	" " " "
" " Lyman to Liberty st.	1903	484	2,780	Grooved wood block " " "
" " Liberty to Sharon st. (east side).....	1908	453	1,135	Wood block " " "
" " " " Cypress st. (west side).....	1890	(270)	880	Granite block
" " Cypress to Sharon st. (west side).....	1891	(183)	580	" " " "
" " Sharon to near Franklin st.	1891	545	2,920	" " " "
" " near Franklin to Carew st. (east side).....	1897	1,302	4,605	Syracuse brick
" " Emery to Sargeant st. (west side).....	1901	1,447	5,449	Catskill block
" " Crossing opposite Auburn st.	1903		163	" and Metropolitan block
Maple st., High to Central st.	1904	1,563	5,665	Bitulithic
" " State to High st.	1905	593	2,530	"
Plainfield st., s. line of Sargeant to Fulton st.	1902	1,710	10,249	Syracuse brick
Railroad st., Main st. westerly		378	1,098	Granite block
Sanford st., Main to Market st.	1900	102	207	Rock asphalt
State st., Main st. to City Library	1890	1,019	4,084	Granite block
" " Dwight to Chestnut st. (widened) ...	1896		217	"
" " Walnut to Oak st.	1897	847	4,590	Syracuse brick
" " Sherman st. to railroad crossing	1905	820	4,852	Bitulithic
Summer st., Autumn st. to near Kibbe ave.	1895	1,259	4,029	Granite block
" " Kibbe ave. to near Federal st.	1901	787	2,635	" " "
Taylor st., Main to Dwight st.	1904	770	2,580	Bitulithic
Walnut st., State to Union st.	1899	638	2,144	Syracuse brick

LENGTH AND AREA OF PAVED STREETS TO DECEMBER 10, 1905.—Continued.

LOCATION.	Date of Laying.	Length in Feet.	Area in Sq. Yds.	Kind of Pavement.
Walnut st., Union st. to Pendleton ave.....	1900	873	3,140	Syracuse brick
" " Pendleton ave. to Lebanon st.....	1905	1,195	3,888	Bitulithic
White st., Allen to Orange st., in car tracks.....	1902	1,610	2,400	Syracuse brick
Worthington st., Main to Dwight st.....	1896	739	2,644	" "
" " Dwight st. to Fairbanks place.....	1901	1,060	3,869	" "
" " Fairbanks place to Spring st.....	1903	269	1,003	" "
" " Cook's alley to Main st.....	1905	404	1,418	Bitulithic
Total.....		47,393..	179,499	

The wood blocks laid in 1904 are on 5" concrete and mortar base; the granite blocks are laid in sand, the bitulithic on broken stone, and all other pavements on 6" concrete base with 1" sand cushion.

RECAPITULATION.

Material.	Length in Feet.	Area in Square Yards.	Material.	Length in Feet.	Area in Square Yards.
Wood block.....	3,371	17,633	Catskill block.....	2,809	6,823
Granite block.....	11,077	41,696	Metropolitan block.....	1,028	914
Syracuse brick.....	19,498	76,991	Bitulithic.....	7,269	27,437
Rock asphalt.....	1,760	5,758			
Trinidad asphalt.....	586	2,247	Total.....	47,393	179,499

STREETS MACADAMIZED IN 1905.

STREET AND LOCATION.	Length in ft.	Area in sq. yds.	Total Cost.	Cost per sq. yd.
Amherst st., Harvard to Monmouth st....	1,233	4,069	\$2,020.77	\$0.497
Armory st., Worthington st. northerly....	1,512	4,448	2,446.69	.551
Bay st., R. R. crossing to Cambridge st....	416	1,387	638.29	.451
Belmont ave., Garfield st. to Sumner ave. (south side).....	1,624	4,170	2,648.87	.635
Central st., Pine to Hancock st. (between rails and 18" outside).....	(1,903)	1,692	Laid by St.	Ry. Co.
Clark st., Spruce to Hancock st.....	619	1,100	641.31	.583
Grace st., No. Main st. to Birnie ave.....	354	885	867.67	.979*
Grant st., Armory to Magazine st.....	577	1,603	648.87	.404
Greenwich st., N. Main to Becket st....	643	2,143	Laid by W.	H. Dexter
Hickory st., Eastern ave. easterly.....	955	2,123	839.67	.394
Kibbe ave., Worthington to Summer st....	213	710	270.66	.382
Main st., I. O., Front to Oak st.....	1,000	3,955	2,685.46	.679
" " " " " " " ".....	(1,000)	1,148	Laid by St.	Ry. Co.
Oakland st., Dickinson to Orange st.....	979	3,322	2,498.34	.752
Plainfield st., Washburn to Newland st..	642	1,685	4,241.44	1.322*
" " Demond to Wason ave.....	645	1,520		
Portland st., N. Main st. to Birnie ave....	610	2,033	Laid by W.	H. Dexter
Summer st., Federal to Armory st.....	378	1,260	391.76	.312
Wight place, Water st. easterly.....	388	692	420.00	.607
Wilbraham rd., Homer to Benton st. (south side).....	2,600	5,142	3,900.79	.644
Wilcox st., Water st. westerly.....	385	984	606.82	.617
Yale st., Princeton to Monmouth st.....	630	2,256	1,080.13	.479
Totals.....	16,403	48,327	\$26,247.54	

* Includes cost of cinder foundation.

**STREETS ACCEPTED AS PUBLIC WAYS DURING THE YEAR
ENDING DECEMBER 10, 1905.**

NAME AND LOCATION.	Length in Feet.	Width in Feet.
Franklin st., east line Webster st. to west line Murray Hill ave.	200	50
Grand st., Malden to White st.	800	50
Greenwich st., North Main to Becket st.	648	50
Homer st., State st. to Wilbraham road.	580	50
Mountainview st., Forest Park ave. to Belmont ave.	680	50
Portland st., North Main st. to Birnie ave.	610	50
Railroad st., Main to Water st.	560	33 to 41
Richelieu st., Adams st. southerly.	440	40
Worcester st., I. O., extension to Lyons st.	1,120	60
Total length.	5,638	

**STREETS RE-LOCATED AND RE-ESTABLISHED DURING THE
YEAR ENDING DECEMBER 10, 1905.**

NAME AND LOCATION.	Length in Feet.	Width in Feet.
Alden st., Hickory st. easterly (re-located)	300	49.5
Central st., Maple to Mill st. (re-established)	3,950	40 to 50
Mulberry st., Maple to Union st. (re-established)	1,950	33 to 49.5
Parker st., Wilbraham road southerly (re-located)	1,060	49.5
Union st., Ingraham ave. to Oak st. (re-established)	1,550	33 to 50.8
Walnut st., State to Hickory st. (re-established)	5,080	41.25 to 50

BRICK SEWER CONSTRUCTION, 1905.

STREET AND LOCATION.	Size and Shape.	Length in feet.	Total Cost.	Cost per lin. ft.	Average cut in ft.	Materials Excavated.
Mill river intercepting sewer, Hickory st. to Gunn square brook via north shore of Water Shops pond (completion).....	2' 2" x 3' 8" Elliptical.	2,086.0	\$32,818.35	\$10.94	16.0	{ Fine running sand and water
Worcester st., I. O., Chestnut to Holly st.....	1' 10" x 2' 9" Egg shape.	670.4	2,398.09	3.58	9.0	Gravel
Total.....	.....	2,756.4	\$35,216.44			

PIPE SEWER CONSTRUCTION FOR 1905.

STREET AND LOCATION.	SIZES IN INCHES.					Total Lgth. in feet.	Total Cost.	Cost per lin. ft.	Average depth in ft.	Materials Excavated.
	24"	20"	18"	15"	12"	8"				
Adams st., Richelieu st. westerly....					237.0		\$304.12	\$1.28	9	Sandy loam
Allen st., Mill to White st.....						364.5	447.19	1.33	8.2	Loam, rock fill
Armory st., extension southerly.....						324.5	193.87	0.59	8.0	Sand
Central st., Hancock to Spruce st. (relaying)		860.9					1,344.85	1.56	9.1	Sand, clay, water
Chestnut st., south of Bancroft st. (relaying)					107.6		190.55	1.51	5.6	Sandy loam
Cumberland st., No. Main st. easterly				147.0			182.77	1.24	9.1	Clayey loam
Euclid ave., Dickinson st. westerly..				350.0	350.4		778.10	1.10	8.5	Sand
" " " easterly ..						274.8	307.88	1.13	9.0	Sand
Forest Park ave., Sumner ave. southerly (relaying).....						437.8	318.20	0.73	8.4	Sand

PIPE SEWER CONSTRUCTION FOR 1905.—Continued.

STREET AND LOCATION.	Size in Inches.						Total Lgth. in feet.	Total Cost.	Cost per lin. ft.	No. of Sewer pipes laid	Materials Excavated.
	24'	20'	18'	15'	12'	10'	8'				
Greenwich st., compl'n, Becket st. e'y.								\$151.48			
Hampden st., I. O. Holly st. e'y.						150.0	150.0	138.67	0.86		Gravel
" " Chestnut st. east erly (relaying)					173.6		173.6	299.12	1.72	8.0	Gravel
Horace st., Dickinson st. northerly					388.4	410.6	774.0	788.12	1.01	10.0	Sand
Holly st., I. O., Worcester to Hamp- den st.				377.4			377.4	419.11	1.11		Gravel
Kennington ave., Oakland st. e'y.			320.0				320.0	488.42	1.53	12.5	Sand
Market st., Sanford st. s'y (relaying)					200.0		200.0	412.04	2.06	10.0	Clay, filling
*Medford st., Birnie ave. easterly					389.6		372.4	....	....		Clayey loam
Morgan st., Garden brook e'y (relay- ing)			625.8				625.8	1,489.59	2.30	10.0	Sandy loam
Myrtle st., I. O., Worcester st. e'y.						378.2	378.2	355.34	0.94	7.5	Gravel
New st., Dwight st. westerly						164.0	164.0	203.79	1.24	9.5	Filling, muck
N. Main st., extension, Morgan st. s'y.						130.0	130.0	129.20	0.99	6.5	Clay, loam, peat
Railroad st., Water st. easterly					350.9		350.9	490.75	1.39	11.0	Sandy loam
Richelieu ct., Adams st. southerly					160.0	260.0	420.0	452.29	1.08	8.1	Sandy loam
Riverview st., Forest Park ave. s'y.						299.1	299.1	217.89	0.73	7.0	Sand
Springfield st., Atwater ter. northerly	892.2	208.6					1,100.8	1,988.87	1.81	7.8	{ Clayey loam Hard pan
*Springfield st., extension northerly from 18" pipe.							235.7	....	....	6.0	Sand
State st., connecting old with new brick sewer at Old High School.	54.0						54.0	161.88	2.99	9.0	Sandy Loam
Water st., Worthington st. southerly						209.0	209.0	333.54	1.59	11.7	Sandy Loam
Water st., Hampden to Railroad st. (relaying)							321.0	688.58	1.99	11.5	Sandy Loam
Westernview st., Forest Park ave. e'y.						198.0	606.0	511.16	0.84		Sand
White st., extension southerly					189.8		189.8	190.99	1.00	8.5	Sand
Worthington st., junct. of Worthing- ton and Armory Hill sewer to Magazine st.			167.0				167.0	381.28	2.28		
Total	54.0	1,753.1	1,321.4	874.4	3,911.3	3,612.3	11,292.2	\$14,243.68			

* Cost borne by private parties.

PIPE SEWERS BUILT BY PRIVATE PARTIES, 1905.

STREET AND LOCATION.	Size in Inches.			Total lgt. in Feet.
	18"	12"	10"	
Atwater terrace road, Green lane s'ly..	521.0			521.0
Green lane., Rimmon ave. w'ly and n'ly.		744.5	142.5	887.0
Rimmon ave., Green lane northerly	858.9			858.9
Weaver ramble, Rimmon ave w'ly and n'ly		480.5		480.5
Total.....				2,747.4

COST OF SEWER SYSTEM.

Total amount expended on account of Sewers and Drains to December 10, 1905:

1863-1880 inclusive.....	\$395,342 10	1893.....	\$35,857 56
1881.....	48,809 76	1894.....	37,710 58
1882.....	35,020 74	1895.....	34,126 83
1883.....	33,588 60	1906.....	59,057 20
1884.....	42,077 98	1897.....	46,675 42
1885.....	36,078 01	1898.....	59,543 29
1886.....	30,569 91	1899.....	62,674 06
1887.....	40,050 95	1900.....	155,295 45
1888.....	38,450 33	1901.....	95,564 02
1889.....	34,142 92	1902.....	55,458 59
1890.....	36,650 90	1903.....	43,353 52
1891.....	96,444 59	1904.....	45,887 13
1892.....	73,390 00	1905.....	40,094 13

Total amount to date.....\$1,711,914.57

The contract for furnishing GRANITE CURBING during the year was awarded to A. Dickinson of Shailerville, Ct., at \$0.40 per lineal foot for 4-inch curb, and \$0.50 per lineal foot for 6-inch, delivered on the cars at Springfield.

The contract for SIDEWALK CONSTRUCTION was awarded John W. Rochford, who laid about 1,060 square yards of coal tar concrete walk, at \$0.68, and about 700 square yards of coal tar concrete, skimcoat, at \$0.38.

*PRECIPITATION FOR CALENDAR YEAR, 1905.

Month.	Total in Inches.	Greatest Amt. in 24 hrs. Inches.	Dates.	Storms in which the Precipitation exceeded $\frac{1}{2}$ inch per hour.	Max. Rate per Hour— Inches.	Duration of Max. Rate— Minutes.
Jan.	2.61	.69	6 & 7	May 30, .19 inches in $\frac{1}{2}$ hour.	2.3	5
Feb.	1.08	.50	6	June 22, .57 " " " "	1.5	20
Mar.	3.01	.89	25	" 26, .14 " " " "	1.2	5
Apr.	2.19	.80	5 & 6	July 19, .20 " " " "	1.0	12
May	1.11	.32	27	" 29, .39 " " " "	2.3	10
June	3.16	.98	21	Aug. 11, .27 " " " "	1.6	10
July	2.08	1.04	29 & 30	" 15, .62 " " " "	.7	10
Aug.	3.86	1.03	15 & 16	Sept. 3, 1.00 " " 2 "	1.1	10
Sept.	6.89	3.40	3 & 4	" 4, 1.30 " " 1 "	1.6	45
Oct.	1.73	.75	11 & 12	" 20, .25 " " $\frac{1}{2}$ "	2.2	5
Nov.	1.91	1.06	29			
Dec.	3.25	1.88	3			
Total	32.83					

* Includes rain, hail, sleet and melted snow.

Number of days in which the precipitation exceeded .01 inch,	108
Number of days during which snow fell,	22
Date of last snowfall in the spring,	April 17
Date of first snowfall in the fall,	December 9
Highest river, and date,	18.4', April 1
Lowest river, and date,	3.6', July 27
Annual range of river,	14.8
Mean daily height of river,	5.5
Greatest 24-hour rise, and date,	3.6' January 8 and September 20
Greatest 24-hour fall, and date,	2.7' April 3

GENERAL STATISTICS.**CITY OF SPRINGFIELD, MASS., DECEMBER 10, 1905.**

Springfield is situated on the east bank of the Connecticut river, in latitude 42° 06' north, longitude 72° 35' west, at an elevation above sea level of from 65 to over 215 feet.

Zero of "City Base" is 27.1 feet below sea level.

State street, at corner of Main street, is 65.9 feet above sea level, or 98 feet "City Base."

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner avenue, at corner of Belmont avenue, is 187.9 feet above sea level.

Population, census of 1905.	73,540
Number of voters: men, 13,401; women, 403; total,	13,804
Number of polls,	21,061
School enrollment: public, 13,161; parochial, 1,840; total,	15,001
Greatest extent of city, north and south,	5.9 miles
Greatest extent of city, east and west,	8.9 miles
Connecticut river frontage,	4.65 miles
Area, including those portions covered by water, approximately,	24,661 acres

Area by wards: Ward One, 1,733.6 acres; Two, 225.7 acres; Three, 234.8 acres; Four, 413.2 acres; Five, 400.6 acres; Six, 327.4 acres; Seven, 2,197.7 acres; Eight, 19,128.3 acres.

Total park areas, 510.55 acres; Forest Park, 464.24 acres.

Area taxed, 16,185 acres; tax rate, \$15.40 per \$1,000.

Valuation,	Real estate,	\$63,273,380	} \$80,904,477
	Personal,	17,631,147	

Public streets accepted to Dec. 10, 1905,	} 145.51 miles.	{	Wood block,	.64 miles
			Granite block,	2.10 miles
			*Syracuse brick,	3.70 miles
			Sheet asphalt,	.44 miles
			Catskill block,	.53 miles
			Metropolitan block,	.19 miles
			Bitulithic,	1.38 miles
			Macadam,	53.45 miles
			Gravel or dirt,	83.08 miles
Sidewalks laid in public streets to Dec. 10, 1905,			152.41 miles	

*Does not include brick pavement in railway tracks around Court Square.

Electric railways (double track counted twice),	.	.	49.29 miles
Steam railroads,	{	Four tracks, about	4.5 miles
		Double tracks, about	7. miles
		Single track, about	11. miles
Water mains,	.	.	154.7 miles
Gas mains,	.	.	109.5 miles
Sewers, 105.04 miles,	{	Brick sewers,	27.31 miles
		Vitrified clay pipe,	51.69 miles
		Cement pipe,	25.32 miles
		Brick and stone,	.48 miles
		Wood pipe,	.20 miles
		Cast iron,	.03 miles
		Concrete syphon,	.01 miles
Street lights, arc,	987	Engine houses,	12
Street lights, incandescent,	63	Steam fire engines,	6
Houses,	11,457	Spare engines,	1
Schoolhouses,	34	Chemical engine and hose wagons,	13
Churches,	49	Ladder trucks,	3
Post offices,	4	Aerial trucks,	2
Police stations,	2	Water towers,	1
Railroad stations,	7		

CITY EXPENDITURES.

City engineer's department,	.	.	.	.	\$14,515.27
Fire department,	.	.	.	.	123,026.68
Forestry,	.	.	.	.	10,166.93
Street department,	{				212,129.77
	Maintenance,	.	\$125,238.09		
	Paving,	.	36,708.11		
	Macadam and gravel,	.	28,137.96		
	Sidewalks and curbing,	.	22,045.61		
Sewer department,	.	.	.	.	32,250.31
Police department,	.	.	.	.	95,075.51
Public parks,	.	.	.	.	36,171.90
Street lighting department,	.	.	.	.	78,668.21
Water department,	.	.	.	.	143,897.45
School department,	.	.	.	.	293,917.73
Pauper department,	.	.	.	.	44,588.82
Scavenger department,	.	.	.	.	14,600.44
Collection of ashes,	.	.	.	.	21,300.04

PETER, BENJAMIN AND
JOHN FOUNDATIONS

DEPARTMENT EMPLOYEES.

The regular force of Assistants have been employed during the year and in the main are of the same personnel as in 1905, and are comprised of the following:—

Principal Assistant Engineers, Mr. Walter A. Brown and Mr. Herbert E. Flint; Messrs. Edward G. Martin, Chas. A. L. Wright, Ernest F. Young, Chas. J. Hancock and Harold T. Murphy, instrument-men and draughtsmen. Messrs. Edward W. Burnett and Arthur P. Slocum have been employed steadily throughout the year as rodmen and draughtsmen. Also Messrs. John D. Williams and Orrin F. Cooley were employed as rodmen and draughtsmen during the early part of the year.

Miss Alice M. Hancock has performed the work of stenographer and miscellaneous clerical service since the month of April, taking the place of Miss Edith I. Gibbins, who resigned after several years of faithful and efficient service.

The opportunity is taken to acknowledge the coöperation of the various assistants employed and the courtesies extended by the other city departments and committees associated with the work.

Respectfully submitted,

CHARLES M. SLOCUM,

City Engineer.

City Engineer's Report.

BOARD OF ALDERMEN, December 31, 1906.

Read, accepted, ordered printed, and sent down for concurrence.

E. A. NEWELL, *Clerk.*

COMMON COUNCIL, December 31, 1906.

Read and concurred.

H. S. GILBERT, *Clerk.*

Presented to the Mayor for approval, January 1, 1907.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, SPRINGFIELD, MASS., January 1, 1907.

Approved.

FRANCKE W. DICKINSON, *Mayor.*



BITULITHIC PAVEMENT IN MARKET STREET.

THE
FOLIO
ASTOR LENOX
TILDEN FOUNDATIONS

PAVING LAID IN 1906.

LOCATION.	Material.	Length In Feet.	Area in Sq. Yds.	Total Cost.	Cost per Sq. Yd.
Birnie ave., Hooker st. northerly	Johnsonburg paving brick	145	483	\$ 913.49	\$1.89
* Fulton st., Cypress to Vine st.	Granite blocks	1,125	3,006	2,725.78	0.91
Hillman st., Main to Dwight st.	Bitulithic	648	2,025	4,281.01	2.11
Main st., William to Blise st.	Creo-resinate gum wood blocks	1,150	6,460	21,796.45	3.37
Market st., State st. to Harrison ave.	Bitulithic	968	1,887	4,337.70	2.30
North Main st., Plainfield to Morgan st.	Bitulithic	780	4,485	9,338.61	2.08
* Railroad st., Water st. easterly	Granite blocks	137	415	330.35	0.80
" " Main st. westerly (relaying)	Granite blocks	379	1,124	582.16	0.52
Walnut st., Lebanon to Hancock st.	Bitulithic	1,005	3,354	6,862.87	2.06
Total		6,287	23,219	\$51,158.42	

* Old granite blocks laid on sand foundation; cost of blocks not included.

NOTE: The Johnsonburg vitrified clay blocks and the treated black gum blocks are laid on a five-inch Portland cement concrete foundation, the Hassam method being employed on Main street, and the old method of mixing by hand on Birnie ave. between the car tracks. The blocks were on a half-inch cement mortar cushion mixed 1 to 4 dry and the joints filled with Portland cement grout; pitch expansion joints being inserted every 50 feet and along the gutter.

The bitulithic paving consists of bitulithic mixture rolled to a depth of two inches upon a foundation of trap rock which is rolled to a depth of five inches. Paving blocks are laid on a cement concrete foundation alongside the rails of car tracks, Belgian blocks being used on North Main street and Johnsonburg pavers on Walnut street.

LENGTH AND AREA OF STREETS PAVED TO DECEMBER 10, 1906.

LOCATION.	Date of Laying.	Length in Feet.	Area in Sq. Yds.	Kind of Pavement.
Belmont ave., 400' east of Woodside ave., to Hall st., in car tracks.	1901	1,392	1,211	Catskill block
" " Hall to Oakland st., in car tracks	1903	1,023	914	Metropolitan block
Birnie ave., Hooker st. northw'y across car tracks	1906	145	483	Johnsonburg vitrified brick
Bridge st., Main to Dwight st.	1900	684	2,525	Rock asphalt
" " Springfield W. W. building to Main st.	1905	493	1,746	Bitulithic
Catharine st., State to Bay st.	1900	1,722	5,691	Syracuse brick
Charles st., Liberty st. to land of F. A. A. railroad	1903	150	376	Granite block
Chestnut st., Worthington to Lyman st.	1895	472	1,678	" "
" " Lyman st. to B. & A. railroad	1899	266	1,471	" "
" " B. & A. railroad to Linden st.	1892	1,640	5,235	" "
" " Linden to Carew st.	1893	778	2,156	" "
" " Carew to Allendale st.	1900	1,015	3,432	Syracuse brick
" " Allendale st. to Jefferson ave.	1905	825	2,898	Bitulithic
Court st., Court Square ave. to Main st.	1897	317	1,277	Rock asphalt
" " " " easterly, in car tracks	1897	193	503	Syracuse brick
Court Square ave., Court to Elm st.	1904	469	1,700	Rock asphalt
" " " " " " in car tracks.	1907	216	848	Syracuse brick
Cypress st., Main to near Boylston st.	1905	2,324	9,905	Granite block
" " near Boylston to Fulton st.	1896	117	297	" "
Dwight st., State to Lyman st.	1900	343	949	Syracuse brick
East Court st., Main to Market st.	1897	670	380	Rock asphalt
Elm st., Court Square ave. to Main st.	1895	1,125	3,006	" "
" " " " easterly, in car tracks	1906	212	821	Syracuse brick
Fort st., Water to Main st.	1905	394	1,539	Granite block
Fulton st., Cypress to Vine st.	1906	586	2,247	Bitulithic
Hampden st., Main st. westerly	1896	618	2,025	" "
" " 212' west of Main to Water st.	1905			Trinidad asphalt
Harrison ave., Main to Dwight st.	1906			Bitulithic
Hillman st., Main to Dwight st.	1906			

LENGTH AND AREA OF STREETS PAVED TO DECEMBER 10, 1906.—Continued.

LOCATION.	Date of Laying.	Length in Feet.	Area in Sq. Yds.	Kind of Pavement.
Liberty st., Chestnut to Cass st.....	1900	1,399	4,571	Syracuse brick
" " Cass st. to Heywood ave.....	1901	1,147	3,971	" "
Lyman st., Main to Chestnut st.....	1889	1,305	4,599	Granite block
Main st., Locust to Marble st.....	1897	840	4,381	Syracuse brick
" " Marble to William st.....	1896	1,762	8,307	" "
" " William to Bliss st.....	1906	1,150	6,460	Gum wood block
" " Bliss to State st.....	1893	241	1,355	Syracuse brick
" " State to Worthington st.....	1904	1,899	10,798	Wood block (3" x 3½" x 8")
" " Worthington to Hampden st. (west side)	1904	382	1,183	" " "
" " " " (east side)	1903		962	" " (4" x 4" x 8")
" " Hampden to Lyman st.....	1903	153	775	" " "
" " Lyman to Liberty st.....	1903	484	2,780	Grooved wood block " "
" " Liberty to Sharon st. (east side)	1903	453	1,135	Wood block " "
" " " " Cypress st. (west side)	1890	(270)	880	Granite block
" " Cypress to Sharon st. (west side)	1891	(183)	580	" "
" " Sharon to near Franklin st.....	1891	545	2,920	" " "
" " near Franklin to Carew st. (east side)	1897	1,302	4,605	Syracuse brick
" " Emery to Sargeant st. (west side)	1901	1,447	5,449	Catskill block
" " Crossing opposite Auburn st.....	1903		163	" and Metropolitan block
Maple st., High to Central st.....	1904	1,563	5,665	Bitulithic
" " State to High st.....	1905	593	2,530	" "
Market st., State st. to Harrison ave.....	1906	968	1,887	" "
North Main st., Plainfield to Morgan st.....	1906	730	4,485	" "
Plainfield st., s. line of Sargeant to Fulton st.....	1902	1,710	10,249	Syracuse brick
Railroad st., Main to Water st.....	1906	516	1,539	Granite block
Sanford st., Main to Market st.....	1900	102	207	Rock asphalt
State st., Main st. to City Library.....	1890	1,019	4,034	Granite block
" " Dwight to Chestnut st. (widened)	1896		217	" "
" " Walnut to Oak st.....	1897	847	4,590	Syracuse brick

LENGTH AND AREA OF STREETS PAVED TO DECEMBER 10, 1906.—Continued.

LOCATION.	Date of Laying.	Length in Feet.	Area in Sq. Yds.	Kind of Pavement.
State st., Sherman st. to railroad crossing.	1905	820	4,352	Bitulithic
Summer st., Autumn st. to near Kibbe ave.	1895	1,259	4,029	Granite block
" " Kibbe ave. to near Federal st.	1901	787	2,635	" "
Taylor st., Main to Dwight st.	1904	770	2,580	Bitulithic
Walnut st., State to Union st.	1899	638	2,144	Syracuse brick
" " Union st. to Pendleton ave.	1900	873	3,140	" "
" " Pendleton ave. to Lebanon st.	1905	1,195	3,888	Bitulithic
" " Lebanon to Hancock st.	1906	1,005	3,334	" "
White st., Allen to Orange st., in car tracks	1902	1,610	2,400	Syracuse brick
Worthington st., Main to Dwight st.	1896	739	2,544	" "
" " Dwight st. to Fairbanks place.	1901	1,060	3,869	" "
" " Fairbanks place to Spring st.	1903	269	1,003	" "
" " Cook's alley to Main st.	1905	404	1,418	Bitulithic
Total		52,154	196,145	

The wood blocks laid since 1904 are on 5" concrete and mortar base; the granite blocks are laid in sand, the bitulithic on broken stone, and all other pavements on 4" concrete base with 1" sand cushion.

RECAPITULATION.

Material.	Length in Feet.	Area in Square Yards.	Material.	Length in Feet.	Area in Square Yards.
Wood block	4,621	24,098	Catskill block	2,809	6,893
Granite block	11,193	39,688	Metropolitan block	1,023	914
Syracuse brick	19,498	76,991	Bitulithic	10,620	39,168
Rock asphalt	1,760	6,763	Johnsonburg vitrified block	145	488
Trinidad asphalt	586	2,237	Total	52,154	196,145

STREETS MACADAMIZED IN 1906.

STREET AND LOCATION.	Length in ft.	Area in sq. yds.	Total Cost.	Cost per sq. yd.
Andrew st., Barr to Dawes st.....	315	1,015	\$ 622.60	\$0.613
Armory st., Liberty to Cleveland st.....	1,119	3,698	2,018.98	.546
Bliss st., Water st to N.Y., N.H. & H.R.R.	271	903	576.12	.638
Forest st., Belmont to Forest Park ave....	784	2,502	1,354.31	.502*
Forest Park ave., Fort Pleasant ave. to Forest st. (221' wide).....	1,760	4,475	2,392.13	.534
Homer st., State st. to Wilbraham road...	582	1,940	1,026.18	.529
James st., Walnut to Cedar st.....	928	2,356	878.01	.373*
Lexington ave., Chestnut to Massasoit st.	622	1,659	1,305.21	.786
Leyfred ter., Belmont ave. northerly....	625	2,102	1,717.10	.825†
Lillian st., Oak to Orleans st.....	387	989	536.98	.543
Maplewood ter., Fort Pleasant to Forest Park ave. (south side).....	1,301	3,075	1,655.79	.538
Medford st., Birnie ave. to North Main st.	624	2,080	Laid before becoming public.	
Mountainview st., Belmont to Forest Park ave.....	682	2,330	1,157.61	.497*
Oakland st., Allen to Orange st.....	1,605	5,350	3,270.78	.612
Plainfield st., Rowland to Demond ave....	1,137	3,160	2,827.40	.894†
Prospect st., Massasoit to Carew st. (in- complete).....	817	2,996	1,012.06	.338*
Quincy st., Hancock st. to Eastern ave....	1,345	3,902	1,807.87	.463
Sumner ave., Lenox st. easterly across the X.....	484	4,254	2,945.48	.692
Union st., Oak st. easterly (widening)...	(163)	369	157.74	.428
Waltham ave., Wilbraham road to Wil- braham ave.....	985	2,628	1,245.73	.474
Warwick st., Heywood st. easterly.....	811	2,703	1,619.49	.595
Worcester st., I. O., Oak st. to Fiberloid factory (18' wide).....	4,494	8,988	6,041.31	.672
Totals.....	21,678	63,474	\$36,068.88	

* A part of the trap rock used was obtained from other streets. Cost of such rock is not included.

† Includes cost of cinder foundation.

**STREETS ACCEPTED AS PUBLIC WAYS DURING THE YEAR
ENDING DECEMBER 10, 1906.**

NAME AND LOCATION.	Length in Feet.	Width in Feet.
Abbe ave., Plainfield st. westerly.....	925	50
Alderman st., Dickinson to Pomona st.....	1,330	60
Berkshire st., I. O., Oak st. easterly.....	325	55
Birnie ave., Arch to Thomas st.....	1,965	50
Cortland st., State st. northerly.....	650	50
Dukes st., I. O., Berkshire to Holly st.....	400	60
Fiberloid st., I. O., Berkshire to Worcester st.	2,300	60
Grenada ter., Dickinson st. to Pomona st.....	1,097	85
Hampden st., I. O., Chestnut to Holly st.....	600	60
Holly st., I. O., Berkshire to Worcester st.....	1,045	60
Marion st., Pease to McKnight st.....	520	50
Medford st., North Main st. to Birnie ave.....	624	50
Melrose st., Eastern ave. westerly.....	580	33
Ormond st., Sumner to Belmont ave.....	360	50
Pease st., Bowles to Marion st.....	148	50
Pomona st., Sumner ave. to Alderman st.....	900	60
Scott st., Pomona to White st.....	640	50
Total.....	14,409	

STREETS RE-LOCATED DURING THE YEAR ENDING DECEMBER 10, 1906.

NAME AND LOCATION.	Length in Feet.	Width in Feet.
Boston road, near old Bay road.....	1,962	66
Bridge st., Main to Chestnut st.....	1,065	49+
Main st., Mill st. northerly.....	200	—
Mill st., Main st. easterly.....	245	—
Oak st., State to Walnut st.....	1,350	40+
Old Wilbraham road, Pomona to White st.....	1,230	60
Union st., widening, Oak st. easterly.....	163	49.5
Wilbraham road, at Sixteen-Acre mill pond.....	200	49.5
Total.....	6,415	

CLAY PIPE SEWER CONSTRUCTION FOR 1906.

STREET AND LOCATION.	SIZES IN INCHES.				Total Lgth. in feet.	Total cost incl. man- holes and flush gates.	Cost per sq. ft. of pipe and excav.	Materials Excavated.
	24"	20"	18"	15"	12"	10"		
Abbe ave., Plainfield st. westerly....	694.6	300.4	299.8	300.5	199.9	1,100.6	\$1,405.16	10.4 Clayey loam
Avon place, Maple st. easterly.....						694.6	3,359.45	13.5 Sandy loam, water
Center st., I. O., ex'n Pine to Cedar st.						648.5	4,841.5	6.7 Coarse gravel
Clarendon st., St. James ave. to Sherman st. (relaying).....				280.4	348.8	299.7	644.61	
Davis court, Bridgeto Harrison ave....				604.4			1,340.27	15.1 Sand
Essex st., I. O., Oak st. easterly....				450.2			600.67	1.11 Filling
Farnsworth st., Hamburg st. n. e'y....					182.8		274.98	1.50 Coarse gravel
Franklin st., ext'n to Genesee st.	186.0						182.8	7.5 Sand, water
Genesee st., Franklin to Liberty st....					26.7		608.11	incomplete
Grenada ter., Ventura ave. easterly....							34.80	7.5 Clay
Hamburg st., Springfield st. east'y....					76.4		257.73	1.90 Clay
King st., Westford to Wilbraham ave							52.72	8.6 Sand
Main st., Mill River to Mill st.							1,067.30	1.77 Sand, water
Maple st., ext'n s'y to Maple st. ave					235.8		321.81	7.5 Sand
Market st., Sanford to Harrison ave.					427.2		842.25	1.32 Sand, water
Park st. Main to Willow st. (relaying)	394.7				258.2		1,289.58	6.6 Sandy loam, hardpan
Portsmouth st., Eastern ave. easterly							650.7	1.84 Clayey loam
Quebec st., I. O., Lyons st. easterly							1,197.72	10.3 Clayey loam, water
Sachem st., Dickinson st. northeas'y							394.7	1.07 Sand
Stebbins st., extension northerly							211.5	1.00 Sand
Temple st., Maple st. easterly.....							219.06	1.00 Sand
Walham ave., extension southerly....							402.82	1.92 Sand
Westford ave., W'd circ. to King st.							845.81	1.04 Sand
White st., Gordon st. to Dawson ave.							37.39	5.5 Sand
Whittier ave., Sumner ave. to Long- fellow ter.....							201.94	1.30 Sand
William st., Main to Dale st. (relaying)							329.69	7.6 Sand
Willow st., Union to Hubbard ave.							454.36	7.4 Sand
Worcester st., I. O., ext'n e'y of Pine							187.69	9.5 Sand
(relaying)								
Total	1,089.3	558.0	825.4	1,542.6	4,709.7	8,120.4	11,840.4	\$19,195.51

NOTES.—Abbe avenue had 120 ft. of 6" underdrain; 3 tons broken stone and 500 ft. b. m. sub-sheeting.

Avon place had 339 ft. of 8" underdrain; 28 tons of broken stone and 3,000 ft. b. m. sub-sheeting.

Park street, 240 lin. ft. excavated 1 ft. below grade and refilled with broken stone and (1-2-4) concrete; 45 tons of broken stone and 1,000 ft. b. m. sub-sheeting used.

The average cost of manholes was \$34.65 and of flush gates \$30.90.

COST OF SEWER SYSTEM.

Total amount expended on account of Sewers and Drains to December 10, 1906:

1868-1880 inclusive.....	\$395,342 10	1894.....	\$37,710 58
1881.....	48,809 76	1895.....	34,126 83
1882.....	35,020 74	1896.....	59,057 20
1883.....	33,588 60	1897.....	46,675 42
1884.....	42,077 98	1898.....	59,543 29
1885.....	36,078 01	1899.....	62,674 06
1886.....	30,569 91	1900.....	155,295 45
1887.....	40,050 95	1901.....	95,564 02
1888.....	38,450 33	1902.....	55,458 59
1889.....	34,142 92	1903.....	43,353 52
1890.....	36,650 90	1904.....	45,887 13
1891.....	96,444 59	1905.....	40,094 13
1892.....	73,390 00	1906.....	41,134 24
1893.....	35,857 56		
Total amount to date			\$1,753,048 81

CONTRACT PRICES IN 1906.

The city paid \$0.40 per lineal foot for 4-inch granite curbing, and \$0.50 for 6-inch.

Portland cement (Atlas) cost \$2.03 per bbl.

Rosendale cement (Hoffman) cost \$1.26 per bbl.

Tar concrete walk was laid by contract at \$0.62 per square yard; skim-coat work at \$0.34 per square yard.

Trap, rock cost \$1.00 per ton on the N. Y., N. H. & H. R. R., and \$0.80 per ton on the B. & A. R. R.

*PRECIPITATION FOR CALENDAR YEAR, 1906.

Month.	Total in inches.	Greatest Amt. in 24 hr.	Dates.	Storms in which the Precipitation exceeded $\frac{1}{2}$ inch per hour.	Max. Rate per Hour— Inches.	Duration of Max. Rate— Minutes.
Jan.	2.33	.59	3 & 4	May 28, 1.08 inches in 2 $\frac{1}{2}$ hours	.7	20
Feb.	1.94	.77	9	June 2, .4 " " " "	3.6	7
Mar.	3.86	2.13	3 & 4	" 6, .25 " " " "	1.2	10
Apr.	3.44	1.63	9 & 10	" 17, 1.5 " " " "	—	—
May	4.89	2.78	27 & 28	July 17, 1.2 " " " "	1.9	20
June	4.20	2.05	16 & 17	" 30, .4 " " " "	1.5	10
July	4.12	1.52	17	Aug. 4, .95 " " " "	3.2	15
Aug.	3.05	1.19	4	" 11, .26 " " " "	1.	10
Sept.	3.31	.94	20 & 21	Sept. 12, .65 " " " "	2.0	20
Oct.	6.15	2.79	20	" 20, .61 " " " "	1.4	20
Nov.	2.10	1.31	11 & 12	Oct. 20, 1.85 " " " "	1.1	40
Dec.	2.98	1.24	31	" 25, 2.00 " " " "	1.9	30
Total	42.37					

*Includes, rain, hail, sleet and melted snow.

Number of days in which the precipitation exceeded .01 inch,	114
Number of days during which snow fell,	22
Date of last snowfall in the spring,	April 9
Date of first snowfall in the fall,	November 13
Highest river, and date,	15.1', April 17
Lowest river, and date,	3.0', October 8
Annual range of river,	12.1
Mean daily height of river,	5.45
Greatest 24-hour rise, and date,	5.8', May 29
Greatest 24-hour fall, and date,	2.2', " 31

GENERAL STATISTICS.

CITY OF SPRINGFIELD, MASS., DECEMBER 10, 1906.

Springfield is situated on the east bank of the Connecticut river, in latitude 42° 06' north, longitude 72° 35' west, at an elevation above sea level of from 65 to over 215 feet.

Zero of "City Base" is 27.1 feet below sea level.

State street, at corner of Main street, is 65.9 feet above sea level, or 93 feet "City Base."

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner avenue, at corner of Belmont avenue, is 187.9 feet above sea level.

Population, special census of 1906,	75,968
Number of voters: men, 13,612; women, 367; total,	13,979
Number of polls,	21,673
School enrollment: public, 13,582; parochial, 1,935; total,	15,517
Greatest extent of city, north and south,	5.9 miles
Greatest extent of city, east and west,	8.9 miles
Connecticut river frontage,	4.65 miles

Area, including those portions covered by water, approximately, 24,661 acres

Area by wards: Ward One, 1,733.6 acres; Two, 225.7 acres; Three, 234.8 acres; Four, 413.2 acres; Five, 400.6 acres; Six, 327.4 acres; Seven, 2,197.7 acres; Eight, 19,128.3 acres.

Total park areas, 511.28 acres; Forest Park, 464.24 acres.

Area taxed, 16,185 acres; tax rate, \$15.00 per \$1,000.

Valuation,	Real estate,	\$68,239,990	} \$86,505,181
	Personal,	18,265,191	

Public streets accepted to Dec. 10, 1906,	}	148.47 miles.	{	Wood block,	.86 miles
				Granite block,	2.12 miles
				*Syracuse brick,	3.70 miles
				Sheet asphalt,	.44 miles
				Other brick pavers,	.75 miles
				Bitulithic,	2.01 miles
				Macadam,	56.79 miles
				Gravel or dirt,	81.80 miles
Sidewalks laid in public streets to Dec. 10, 1906,				156.58 miles	

*Does not include brick pavement in railway tracks around Court Square.

Electric railways (double track counted twice),	.	.	51.65 miles
Steam railroads,	.	{ Four tracks, about	4.5 miles
	.	{ Double tracks, about	7. miles
	.	{ Single track, about	11. miles
Water mains,	.	.	156.84 miles
Gas mains,	.	.	113.74 miles
Sewers, 106.68 miles,	.	{ Brick sewers,	27.31 miles
	.	{ Vitrified clay pipe,	53.92 miles
	.	{ Cement pipe,	24.73 miles
	.	{ Brick and stone,	.48 miles
	.	{ Wood pipe,	.20 miles
	.	{ Cast iron,	.03 miles
	.	{ Concrete syphon,	.01 miles
Street lights, arc,	1,008	Engine houses,	12
Street lights, incandescent,	62	Steam fire engines,	6
Houses,	11,684	Spare engines,	1
Schoolhouses,	34	Chemical engine and hose wagons,	13
Churches,	52	Ladder trucks,	3
Post offices,	4	Aerial trucks,	2
Police stations,	2	Water towers,	1
Railroad stations,	7	Motor auxiliary,	1

CITY EXPENDITURES.

City engineer's department,	.	.	.	\$13,351.76
Fire department,	.	.	.	144,834.26
Forestry,	.	.	.	12,582.18
Street department,	{	Maintenance,	\$117,243.99	229,333.04
	{	Paving,	50,574.66	
	{	Macadam and gravel,	36,420.19	
	{	Sidewalks and curbing,	25,094.20	
Sewer department,	.	.	.	38,980.02
Police department,	.	.	.	100,862.30
Public parks,	.	.	.	37,044.21
Street lighting department,	.	.	.	80,265.57
Water department,	.	.	.	185,914.58
School department,	.	.	.	310,433.29
Pauper department,	.	.	.	46,464.44
Scavenger department,	.	.	.	15,691.83
Collection of ashes,	.	.	.	22,853.56



Annual Report

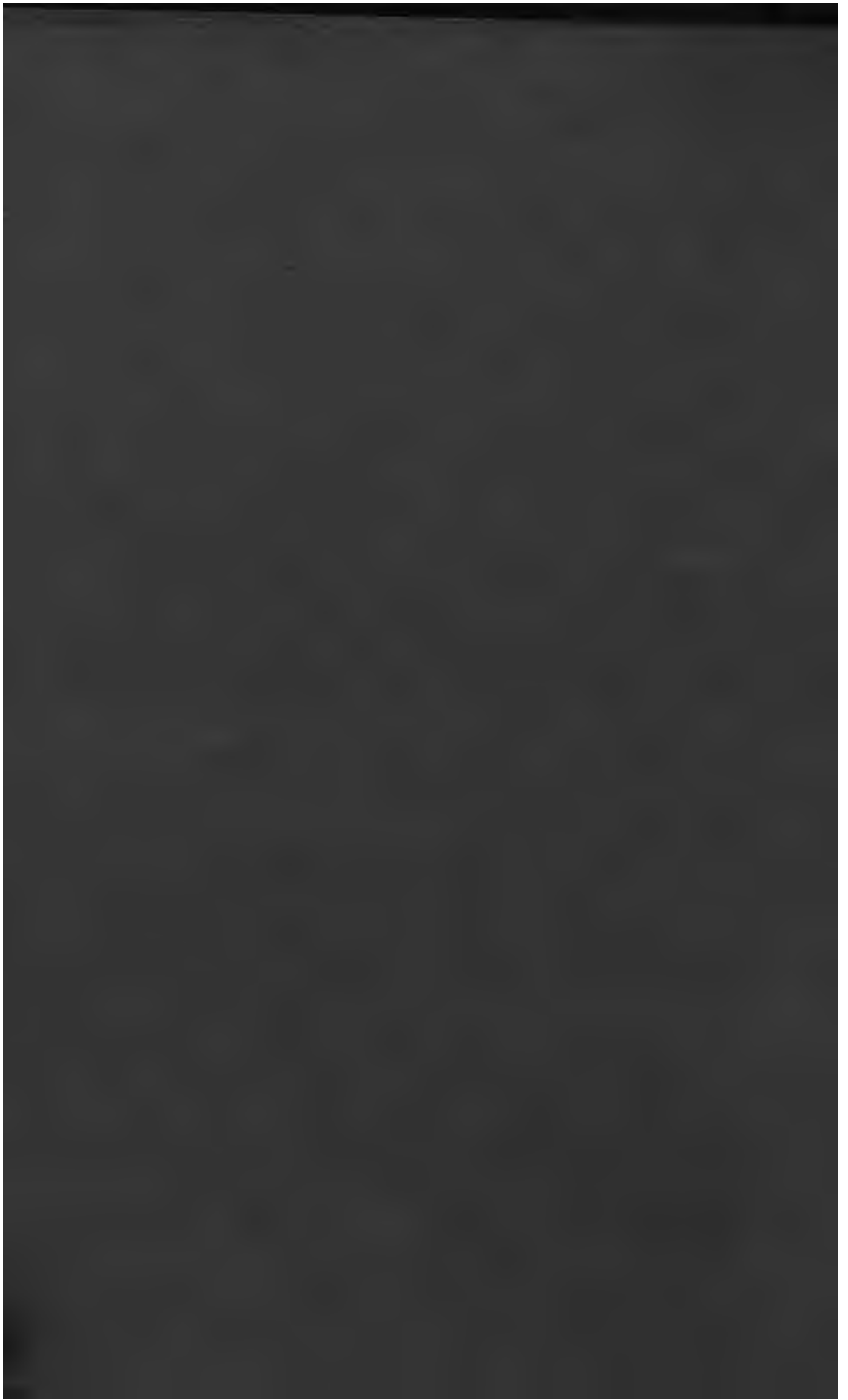
City Engineer

Springfield

Mass.



For the Year 1907



CITY OF SPRINGFIELD

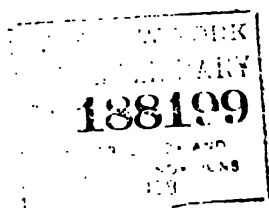
MASSACHUSETTS

Compliments of

CHARLES M. SLOCUM

City Engineer

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REPORT OF THE CITY ENGINEER.

CITY OF SPRINGFIELD, MASS., December 30, 1907.

To the City Council:—

The report of the operations of the Engineering Department for the fiscal year ending November 30, 1907, is herewith respectfully submitted.

FINANCIAL STATEMENT.

RECEIPTS.

Annual appropriation for the year 1907.....	\$9,500 00	
Receipts from other city departments.....	2,357 90	
		<hr/>
		\$11,857 90

EXPENDITURES.

Salaries of City Engineer and assistants....	\$9,379 29	
Office rent and lighting.....	564 90	
Drawing materials, stationery and general supplies.....	420 35	
Car fares, automobile service, and sundry office expenses.....	797 34	
		<hr/>
		\$11,161 88
		<hr/>
Balance unexpended,		\$696 02

DESCRIPTION OF EXPENDITURES.

ENGINEERING DEPARTMENT.

For all services performed on account of matters referred to the Board of Public Works by the City Council relating to the laying out or alteration of streets, sidewalks, sewers, and

parks; for surveys and levels, plans and profiles, estimates of cost, releases from damages, reports to the City Council, and general correspondence relating to matters referred to the Board, and all clerical work performed relating to public hearings and all meetings of the Board; measuring and assigning house numbers, work upon house number books and records, and making new plans; furnishing street lines and grades to individuals for buildings, grading, fencing, and sidewalk construction; surveys, estimates, and all general services performed for the various committees of the City Council; general map, plan, and profile drawing of streets, sewers, and public property for office records and for future reference; measuring and recording all sewer connections for house drains, and furnishing lines and grades; preparation of plans for the City Solicitor's use and attendance at court; indexing plans and other records; photographing and blue-printing, examination of deed records, setting of street monuments, and all the other services not charged to other city departments, the sum of

\$7,047.86

HIGHWAY DEPARTMENT.

For all services performed on account of and charged to the street work appropriation; estimates and plans, lines and grades for paving, macadam and gravel, inspection of contract work, final measurements, and all other incidental work, the sum of

\$257.11

SIDEWALK AND CURBING DEPARTMENT.

For all services performed for the general sidewalk and curbing appropriation; lines and grades for laying out and construction, measurements for assessments, and all work incidental thereto, the sum of

\$295.10

SEWER DEPARTMENT.

For all services performed on account of the general sewer

appropriation; plans, estimates, laying out of work and general supervision of construction details, and all other incidental work, the sum of \$598.17

WATER DEPARTMENT.

For all services performed for the Water Department; making plans; running street lines for laying new mains, and all incidental work, the sum of \$5.40

ASSESSORS' DEPARTMENT.

Plans and surveys and examination of deed records, the sum of \$772.80

PARK DEPARTMENT.

For all services performed for the Park Department; surveys and plans for laying out new street along southerly boundary of Forest Park and all other work for Park Commissioners, the sum of \$51.87

FORESTRY DEPARTMENT.

For services performed for the Forestry Department; looking up distances for street guideboards, photographing for prosecution of smoke nuisance cases, the sum of \$19.05

ARMORY STREET SCHOOLHOUSE ADDITION ACCOUNT.

For services performed on account of the Armory street schoolhouse addition; giving lines and grades for walks, the sum of \$3.00

WATERING STREETS ACCOUNT.

Lengths and widths of roadways for assessments, the sum of \$6.00

CHESTNUT AND SPRINGFIELD STREETS WIDENING.

Lines and grades and setting street monuments and other incidental work, the sum of \$91.25

City Engineer's Report.

CHESTNUT STREET SCHOOLHOUSE ADDITION ACCOUNT.

MICHAEL MALONEY, CONTRACTOR.

Grading and sidewalk grades, Chestnut Street School addition, the sum of \$15.06

SCHOOL—SUMNER AVENUE.

Copying deeds, surveys, plans, and blue-prints of Cemetery lot, Sumner avenue, the sum of \$8.75

SPRINGFIELD STREET RAILWAY COMPANY.

Grades for tracks on Walnut and North Main streets, the sum of \$14.00

(Bill carried over from 1906.)

FOURTH OF JULY FUND.

Staking out racing course for Fourth of July athletic sports, the sum of \$2.75

BOARD OF HEALTH DEPARTMENT.

Surveys and plan for change of boundary lines, \$13.00
(Bill carried over from 1906.)

POLICE DEPARTMENT.

Measuring building corner of Hickory street and Woodbine avenue for evidence in Court, the sum of \$3.00

LAW DEPARTMENT.

Photographs of defective sidewalks, the sum of \$4.35

FIRE DEPARTMENT.

Map of city showing water mains, fire alarm boxes and engine houses; establishment of lines Bond street engine house and Chestnut street engine house, the sum of \$54.75

ABBE AVENUE OVERHEAD CROSSING ACCOUNT.

Plans and estimates for earth approaches and for superstructure for new overhead crossing; lines and grades for filling and estimating earthwork and all other incidental work, the sum of \$118.99

PECOUSIC AVENUE WIDENING AND RELOCATION.

Plans and surveys; lines and grades for grading and other incidental work, the sum of \$26.25

GENERAL WORK OF THE DEPARTMENT.**PAVING.**

A large amount having been expended for macadamizing and graveling of streets, the moneys available for paving were somewhat limited as compared with the amounts expended for paving in some previous years.

The Board of Supervisors, early in the season, decided that the most needful work was the removal of the granite block paving in Main street between Liberty and Franklin streets, and the substitution therefor of the creco-resinate wood block pavement, laid on a concrete base; this form of pavement giving better satisfaction to merchants and the business interests along our main thoroughfare than any other paving material heretofore used. Owing to difficulties in obtaining the blocks, they were not delivered until the late fall season. The pavement was laid on a five inch concrete base, made of Portland cement, sand and trap rock, with proportions one, two and six; the blocks laid on a cushion coat of mortar one half an inch thick.

The double tracked street car line was relocated for a part of the distance and the track laid on a concrete foundation with a view to obtaining greater stability of the track and less tendency to work on the adjoining paving.

GRANITE BLOCK PAVING.

The granite blocks removed from Main street were used in part for the short stretch on Bridge street, between Water street and Connecticut river. The depression in street grade under the bridge carrying the tracks of the New York, New Haven and Hartford railroad has for many years been muddy and unpleasant for the public use, especially during wet weather, and it is expected that the block paving will remedy this in the main.

Summer street granite paving was increased by the paving of the section lying between Spring and Autumn streets. Summer street was difficult to maintain satisfactorily, owing to the heavy traffic from the freight house as well as the heavy teaming passing through the whole length of the street.

All the granite block paving laid in the city has been laid on sand bed and joints filled with sand, and has never been quite satisfactory to the public since the introduction of the smoother forms of pavement laid on a concrete foundation. Its use in our main business thoroughfare was attended by numerous complaints because of the noise and roughness.

ASPHALT AND BITUMEN.

No new work has been done this year with these materials. Small repairs have been made to the rock asphalt on Bridge street, which shows some tendency to creep. Some repairs have also been made to the Bitulithic paving laid in 1905 and 1906, which has shown some tendency to unevenness of wear, as compared with the first paving laid of this kind.

TARVIA TREATMENT.

Early in the season experiment was made with the Tarvia process on the macadam of State street hill. The surface between the street car tracks and the curbing on the south side of street was so treated from the High School to Olivet Church.

This section of State street is subjected to considerable heavy traffic, being our main thoroughfare leading on to the hill, and it was realized that the treatment would be called on to withstand severe usage. It has not developed all that its promoters anticipated and at the present time it is difficult to observe much difference between the surface treated and that immediately joining that not treated. The process is perhaps better adapted to road surfaces that are subjected to lighter traffic.

The attempt to add to the durability of our macadam road surfaces, at the same time rendering them more cleanly and free from dust, is certainly most commendable.

COST AND AMOUNT OF PAVING.

A table is added at the end of this report showing the cost and the amount of the various kinds of paving laid during the year, as well as the whole amount of paving now laid in the city; the cost of granite block paving, not including new blocks, as those used were taken from other streets.

SEWERS.

There has been the usual amount of sewer work during the year, although the larger and more important work has been confined to small egg-shaped sewers. Early in the season it was decided to make a departure in the type of construction and all sewers not laid with vitrified pipe were constructed with Portland cement concrete, without reinforcement. In a general way the work has been very successful and it was found that while the work has been executed in a manner in no way inferior to the former brick construction, the cost has been very materially reduced, thereby permitting a larger amount of work to be done with the appropriation for sewer work.

Portland cement concrete is entering into nearly all kinds of construction and its use is increasing from year to year, re-

sulting in most instances in a reduction of cost without any sacrifice of utility or durability. Nearly all of the expensive labor involved in the construction of brick sewers is avoided in the use of concrete.

All sewers laid with Portland cement concrete were constructed by days' labor, under the direction of the Sewer and Engineering departments. It is possible that this type of construction may be further extended by its use where vitrified pipe might be employed. It is considered expedient that judicious experiment should be made in this direction and that due attention should be given to the experiments of other localities.

There remains the usual demand for sewer extensions into suburban territory to meet the necessities of real estate development, some of which can only be met by the extensions of trunk lines. These demands are being met as rapidly as means will permit, having regard for the reasonable returns in sewer entrance fees.

CAREW STREET SEWER.

The extension of the Carew street sewer to Armory street provides sewerage facilities for a section of considerable area that has been waiting for two or three years, and permits further extension to Liberty street, to a connection with the pipe sewers laid during the year beyond this point in both Carew and Liberty streets, which at present are temporarily connected to Liberty street sewer for an outlet.

The sewer laid in Carew street also permitted the laying of a pipe sewer in Armory street northerly from Carew street as far as the Hampden County Truant school.

OAK STREET SEWER.

The eighteen inch cement pipe sewer in Oak street has been inadequate for a long time to provide for the heavy showers and

storms draining into this sewer. It was replaced by an egg-shaped sewer constructed with Portland cement concrete, between Union and State streets. It was also extended with pipe sewer construction into St. James avenue as far as Ripley place. The new sewer in Oak street will permit the enlargement of the State street sewer easterly of Oak street, which has been inadequate for many years to provide for all the run-off from heavy storms.

BELMONT AVENUE SEWER.

An extension of Belmont avenue sewer was made as far easterly as Woodlawn street, and will provide for several branch sewers in connecting streets, some of which now have dwellings erected thereon that need sewerage facilities. Cement concrete was used for the invert of this sewer and brick for the arch.

PLAINFIELD STREET SEWER.

A cement concrete sewer has been laid in Plainfield street from the trunk sewer in Rowland avenue and extending southerly to a new street to be opened through land recently owned by P. B. Moore. This work nearly reaches to the southerly limit of the watershed tributary to this sewer.

PECOUSIE AVENUE AND LONGHILL STREET SEWERS.

Several fine residences now erecting on the westerly side of Longhill street, near the top of the hill, and the necessities for drainage at the foot of the hill in Main street and Pecousie avenue, required that a new sewer should be provided for this locality. A new sewer was therefore laid of cement concrete, from Mill river through Pecousie avenue to Main street, and in Main street to and into Longhill street. A pipe sewer from this point was laid up the hill in Longhill street to Warner place. This construction provides for branch sewers in Pecousie ave-

nue and Main street as far south as South End bridge, also easterly in Main street to Mill River bridge. It will also drain the territory lying easterly of Longhill street to Fort Pleasant avenue.

The above work covers a total length of 5013 lineal feet of sewers constructed of Portland cement concrete, and in addition there has been laid during the year 21,725 lineal feet of pipe sewers, making a total for all sewers laid, of 5.08 miles.

A table at the end of this report gives the usual data and cost of all sewers laid during the year.

ABBE AVENUE CROSSING.

The preliminaries for a crossing of the Boston and Maine railroad with an overhead bridge, were mainly provided for in 1906, and the plans as finally made involve an overhead crossing spanning the entire width of the railroad location, a length of 172.5 feet, with a single span, erected on two abutments of cement concrete and two inclined approaches, one connecting on the east with Abbe avenue, the other on the west with Fiske avenue at junction of Rowland avenue; the single span through bridge to have a roadway 24 feet wide and one sidewalk on the northerly side, of 6 feet, the floors to be paved with treated wood blocks laid on a wooden underfloor.

The County Commissioners having authorized the City Council to lay out and construct the bridge, the City Council passed an order early in the season for the construction of the crossing, and the necessary land was taken for the approaches. As soon as detailed plans could be prepared the city immediately began the construction of the concrete abutments. A power concrete mixer was purchased and a derrick erected for the better handling of the materials and the work was diligently prosecuted by the Street department by days' labor until completed.

The bridge superstructure was advertised, and the Boston Bridge Works was awarded the contract for furnishing the materials and erecting the bridge.

The Street Department placed some 6,000 cubic yards of earth filling in the approaches and the balance of the filling, about 20,000 cubic yards, was advertised and let to F. T. Ley & Co. of this city at 75 cents per cubic yard. Both of said approaches are now nearing completion and it is expected that the bridge superstructure will be completed during the winter.

The completion of this work will furnish the public with a safe and convenient crossing over the Boston and Maine railroad that has long been needed. Heretofore there has been no public crossing over said railroad between Plainfield street and the Chicopee line.

CLINTON STREET UNDERPASS.

The Boston and Maine railroad company officials, early in the fall season, requested the city to consider with them the general improvement of the Clinton street underpass, where it passes under the Boston and Maine railroad. The company having recently placed in Hampden Park additional tracks adjoining its freight yard for the purpose of providing better freight facilities, and as the teaming to and from said new tracks must pass through the Clinton street underpass, it was considered expedient that said underpass should be improved and new approaches from the same provided, connecting with Fulton street, one to the north and the other to the south. After due consideration by counsel of the city and railroad company, it was decided that in accordance with recent legislative authority, a general agreement should be entered into by both the city and the railroad company, prescribing what alterations should be made and who should make the alterations. Such an agreement was made and it was provided that the underpass should be improved by lowering the grade under the railroad bridge

as much as the elevation of the Clinton street trunk sewer would permit. Also the sidewalk width on the north side of the street was changed from six to four feet, to admit of a slight increase in width of roadway. The lowering of the grade gives a clear headway under the bridge of twelve feet, and the two inclined ramps or approaches to Fulton street have a grade of four per cent.; the width of each ramp to be thirty feet, and suitable retaining walls and railings constructed.

It was further provided that the underpass and the two inclined approaches shall be paved with granite blocks, and that portion of the pavement lying over the sewer to have a concrete base six inches thick. The railroad company started the work in the late fall, and it is now progressing as rapidly as the winter season will permit.

CHESTNUT AND SPRINGFIELD STREETS WIDENING.

The City Council's order, based on the report of the Board of Public Works, for the widening of Chestnut street and Springfield street on the easterly side, from Montmorenci street to the top of the Springfield street hill, has been carried out, and the streets are now 80 feet wide throughout said widening, the former width being 66 feet. New sidewalks have been provided on the Chestnut street front, also on the Springfield street front, of the Springfield Hospital grounds.

A petition is now before the Board of Public Works for the widening of the remaining portion of Springfield street, extending to the Chicopee line. As this is the main thoroughfare to Chicopee, it would appear wise to provide for the future by making the street a sufficient width to provide for the reasonable necessities of the public.

MILL RIVER BRIDGE--PECOUSIC AVENUE.

In connection with the widening and relocation of Pecousic avenue made last year, provision was made for a bridge crossing

Mill river. Plans were prepared during the summer for a concrete steel structure, with a span of twenty-four feet and a length of one hundred feet. The work was twice advertised and finally let to Culgin & Pace of New York city. Owing to the lateness of the season it was deemed best that the work of construction should be deferred until the following spring.

Pecousic avenue has been partially graded for the new widening from fifty to one hundred feet, as far as materials on site of work would permit. It was intended, at the time of the passage of the order, that considerable of the filling for the widening should be made with the ashes delivered near the locality, effecting thereby a saving in cost.

BOARD OF PUBLIC WORKS.

The Board of Public Works has had the usual number of field hearings and office meetings upon the various matters presented to the City Council and referred to the Board, relating to street alterations, sidewalks and sewers. Thirty-nine sessions have been held by the Board. Among the more important matters referred to the Board, not yet reported, are the following:—

ALBANY STREET.

A petition for the laying out of a new street running easterly from Armory street, between the two railroads, as far as the land of the Springfield Foundry Company's land, was referred to the Board early last winter. The usual hearings have been given and all interested parties fully heard. The layout as first considered involved some unusual difficulties, inasmuch as it was first proposed that the location should pass over the buildings of the Hampden Paint and Chemical Works. An estimate was made for a steel bridge of two spans, but further consideration made it appear more expedient to adopt the present driveway around the northerly side of the buildings.

until such time as the present old structures should undergo removal or alteration that will permit the street to pass through to Armory street with the same width and direction as the layout easterly of said buildings. While the Board were further considering possible locations and resulting land damages, the large and important proposition, relating to the removal of the New York, New Haven and Hartford railroad to the westerly side of Connecticut river, was receiving the attention of the public. In connection therewith, it seemed quite probable that the land between the railroads, where it was proposed that the new street should be located, would be taken for railroad purposes, this opinion being entertained by many citizens interested in the measure.

The Board therefore decided that while the matter was pending and until some conclusion was reached it would be unwise to lay out the new street with its attendant cost for land damages, grading and macadamizing. In the meantime large manufacturing interests, that have recently acquired a tract of land in the locality with a view to the erection of a large modern foundry plant, have urged speedy action in the proposed street layout, as through errors and misunderstandings connected with the passage of the title for the land, the new foundry interests were without access to a public street. During the winter another petition was referred to the Board by parties interested in the development of real estate in the locality, for the extension of the proposed street northeasterly to St. James avenue.

The last petition has involved much study of possible routes and many conferences with land owners concerning the conditions under which the extension should be made, but up to the present time the Board has not been able to arrange with the parties in a manner that, in their opinion, would properly serve the public convenience and necessity. This is another case where a diversity of real estate interests and independent action failed to provide satisfactory means of communication with

adjoining public thoroughfares, so that the future public interests will be properly protected. This is a positive disadvantage to the city's best growth and development and doubtless legislation should be established that would effectually prevent such a condition. In a study of street layouts in the various cities of the Commonwealth, nearly all show a failure to properly provide for the best interests of the public in this regard.

PRIVATE STREET LAYOUTS.

Notwithstanding the new ordinances of 1902, created for the purpose of placing proper restrictions upon the laying out and opening up of private ways, many cases appear from time to time, where little or no attention is paid to these restrictions. In accordance with the ordinance, the city cannot accept these ways unless the specifications are observed in their making; but as the ordinance stands, there can be no penalty placed upon the individual or corporation who, from selfish motives, seeks to open up a private way at the smallest possible expenditure that will present a tolerable appearance and enable the sale of lots to sundry individuals, who are frequently informed that the city will make things right and improve the street. After the interest is entirely closed out to individuals, the city is petitioned to accept the way and all the individual owners appear to state that they are as heavily taxed as any one else. Therefore why should not the city accept the street and expend the usual moneys for improvement? The original proprietor has departed and informs the city that he is no longer interested. The parties who have bought the lots state that they should not be asked to contribute to the improvement, even if they were able, so that usually but one alternative remains. The city must bear the expense involved or the individuals must suffer.

ASSESSORS' PLANS.

The work of extending the surveys and plans for the use of

the Assessors of Taxes has been carried on during a portion of the year and the sum of \$772.80 expended for this work.

The business section and residential parts of the city have been covered in the main, so that there now remains the suburban and farming districts. It has been found that the only way to keep the plans in condition is to make the necessary corrections from year to year, so that they shall show land boundaries and areas correctly.

BRIDGE MAINTENANCE.

The iron bridges over Connecticut river have had the usual attention to maintenance and renewals of the wooden floor systems, which at best are expensive to keep in proper and safe condition for public travel. The coming year will require the repainting of both the North and South End bridges.

The usual care and oversight have been given to the "Old Toll Bridge," which is now classed with the ancient bridge structures. Its peculiarities of design, as compared with more modern structures, and unsoundness of some of the timbering require more or less oversight to properly safeguard the public.

Small repairs should be made to the planking on the upper face of the piers and also to the timber arch footings where some decay has taken place. Observations upon the alignment of the trusses on the northerly side of the bridge have been made, at times, for a few years, in order that any material change might be noted and provided for. A line has been run through the bridge and referred to fixed points at each end and offsets taken at points between, where changes seemed most likely to occur. Thus far, no material change has been noticed.

DEPARTMENT ASSISTANTS.

For the regular work of the year seven assistants have been employed. Mr. Walter A. Brown, one of the principal

assistant engineers, resigned to engage in private business early in the summer season, leaving the general direction of the office force under the direction of Principal Assistant Mr. Herbert E. Flint; Mr. Edward G. Martin, Mr. Chas. A. L. Wright, Mr. Ernest F. Young, Mr. Chas. J. Hancock, Mr. Harold T. Murphy and Mr. Edward W. Burnett have performed the general work in office and field. There have also been employed, during a portion of the year, Mr. Arthur P. Slocum, Mr. T. F. Hickey, Mr. Fred L. Hunn and Mr. E. T. Riley.

Miss Alice M. Hancock has been employed as stenographer and general clerical assistant.

I desire to express my appreciation of the co-operation of the assistants employed and the courtesies extended by the various committees and city officials with whom the department has been associated.

Respectfully submitted,

CHAS. M. SLOCUM,

City Engineer.

City Engineer's Report.

BOARD OF ALDERMEN, December 30, 1907.

Read, accepted, ordered printed, and sent down for concurrence.

E. A. NEWELL, *Clerk.*

COMMON COUNCIL, December 30, 1907.

Read and concurred.

H. S. GILBERT, *Clerk.*

Presented to the Mayor for approval, December 31, 1907.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, SPRINGFIELD, MASS., December 31, 1907.

Approved.

W. E. SANDERSON, *Mayor.*

STREET CONSTRUCTION.

MACADAM.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Armory street, Banks place, Beaumont street, Birnie avenue,	Carew street southerly, Dickinson street to Belmont avenue, Greenwich to Douglas street and Donald street to Wason avenue, Bay to McKnight street,	451 225 689	1,505 536 2,295	\$0 54 58 58	\$818 48 313 60 1,326 66
Bowles street, Chase avenue, Chestnut street, Clarendon street, Franklin street, Heywood street, Jackson street, Loughill street, Maplewood terrace, Maplewood terrace,	Springfield street southerly, Bay to Worthington street, Charles to Cass street, Liberty to Warwick avenue, Sumner avenue to Maplewood terrace, Sumner avenue to Warner place, Southerly roadway, completion, Northerly roadway, Forest Park avenue to Riverview terrace,	2,762 750 588 100 1,248 1,082 250 283 475	5,379 2,500 1,943 345 4,160 3,605 833 943 2,321	1 16 54 1 16	6,253 31 1,346 54 2,251 19
McKnight street, Monroe street, Murray Hill avenue, Oak street, I. O.,	Sherman to Bowles street, Hancock street to Eastern avenue, Main street northerly,	750 532 1,345 600 360	1,874 1,773 3,736 2,000 1,680	36 48 46 51 55	956 04 851 13 1,706 03 1,016 30 929 34

STREET CONSTRUCTION.

MACADAM—CONTINUED.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Prospect street, Randolph street, Sherman street, Springfield street, *Springfield street gutters,	Massasoit to Carew street, completion, Bay to Clarendon street, Chicopee line southwesterly,	283 95 3,700	943 316 7,400	\$0 47 41 86	\$1,047 40 446 90 128 83 6,385 29
*Springfield street, Union street, Waltham avenue, Warner place, White street,	Chestnut street northeasterly, Water street to N. Y., N. H. & H. R. R., Completion, Orange to southerly line schoolhouse property,	400 414 691	1,355 1,702 2,152	49 68 46	845 11 667 97 1,151 13 69 64 999 55
Woodside terrace, Worcester street, I.O.,	Belmont avenue to Forest Park avenue, Oak to Pine street,	1,502 463 500	5,206 1,543 2,000	63 51 53	3,257 01 790 45 1,067 57
	Less material paid for fiscal year 1908,	20,593	60,045		\$41,322 44
					647 98
					\$40,674 46

*Cost of this work is not included in the expenditures of 1907.

SIDEWALKS AND CURBING.

Fiscal year 1907.

CONSTRUCTION AND RECONSTRUCTION.

By orders of the City Council.

Street.	Length in feet.	SIDEWALKS.		CURBING. Length in feet. 4" 6"	Order approved.
		Material.	Description.		
Acushnet ave.,	1,275	Brick,	Relaid,		June 25, 1907.
Adams street,	1,754	Brick,	Relaid,		Oct. 23, 1906.
Adams street,	50	Tar concrete,	Skim coated,		Oct. 23, 1906.
Alderman street,	1,457.	Tar concrete,	New,	2,356	Jan. 15, 1907.
Banks place,				266	Oct. 27, 1906.
Belmont ave., easterly side,	291	Tar concrete,	Skim coated,		Apr. 16, 1907.
Birnie ave.,	3,846	Brick,	New,	578	Apr. 16, 1907.
Chestnut street, easterly side,				441	Feb. 25, 1907.
Cortland street,	400	Tar concrete,	New,	1,095	May 28, 1907.
Cortland street,	900	Tar concrete,	Skim coated,		May 28, 1907.
Hebron street,	200	Brick,	Relaid,		June 26, 1906.
Market street, easterly side,	76	Brick,	Relaid,		July 2, 1907.
Mason street,				673	Apr. 11, 1906.
Norfolk street,				2,928	Apr. 16, 1907.
Pease street,					{ Special order
Reed street,	116	Tar concrete,	New,	296	{ Maynard's lot.
					Aug. 20, 1907.

SIDEWALKS AND CURBING.—CONTINUED.

Street.	Length in feet.	SIDEWALKS.		CURBING. Length in feet.		Order approved.
		Material.	Description.	4"	6"	
Scott street,	685	Tar concrete,	New,	600		Nov. 1, 1906.
Union street, at Hancock,				69		Apr. 29, 1907.
Union street, at Oak,	161	Brick,	New,	176		Jan. 15, 1907.
Washburn, at Plainfield,				50		Oct. 2, 1906.
Woodside terrace,	121	Tar concrete,	New,			Sept. 11, 1905.
				9,087	441	

SIDEWALKS AND CURBING.

CONSTRUCTION BY ORDERS OF ABUTTERS.

Street.	Length in feet.	SIDEWALKS.		CURBING.	
		Material.	Description.	Length in feet. 4"	6"
Bay street,				47	
*Belmont avenue,				70	
*Berkshire street, I. O.,				77	
Chestnut street,	50	Tar concrete,	Skim coated,		
Chestnut street,	1,809	Tar concrete,	New,		1,402
Clinton street,	50	Brick,	Relaid,		
Fort Pleasant avenue,	100	Tar concrete,	Skim coated,		
*Hancock street,				551	
McKnight glen,				328	
Miscellaneous streets,				116	
*Oakland street,				541	
Oak street, I. O.,				142	
Pease street,	125	Brick,	New,		
Pease street,	48	Tar concrete,	New,	243	
Prospect street,				46	
Sorrento avenue,	84	Tar concrete,	New,		
Springfield street,				434	
Waverly street,	135	Tar concrete,	Skim coated,		
				2,595	1,402

*Curbing furnished by owner of abutting property.

STREET CONSTRUCTION.

PAVING.

Street.	Limits.	Material.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total cost.
*Bridge street,	Water to Old Toll bridge,	Granite blocks,	249	713	\$1 07	\$761 64
**Court street,	Main street westerly.	Syracuse brick,	128			
Main street,	Liberty to Sharon street, west side,	Creo-resinate wood blocks,	(453)			
Main street,	Sharon to near Franklin and Emery, east side,	Creo-resinate wood blocks,	509	4,590	3 34	15,357 07
Main street,	Near Franklin, east side,	Syracuse brick,	36	144	2 61	376 84
**State street,	At St. James avenue,	Syracuse brick,	183	183		
*Summer street,	Spring to near Autumn street,	Granite blocks,	567	1,512	73	1,112 02
	Less material paid for fiscal year 1908,		1,361	7,270		\$17,607 57
						2,798 11
						\$14,809 46

NOTE.—The wood blocks and Syracuse brick are laid on Portland cement concrete foundation and cement mortar bed. The joints are filled with Portland cement grout.

* Old granite blocks laid on sand foundation. Cost of blocks not included.

** Paving laid at the expense of the Springfield Street Railway Company.

MACADAM REPLACED BY PAVING.

STREET.	Limits.	Length in feet.	Area in sq. yds.
Bridge street,	Water to Old Toll bridge,	249	713
State street,	at St. James ave.,	—	183
Summer street,	Spring to near Autumn,	567	1,512
		816	2,408

PAVING REPLACED BY OTHER PAVING.

ROCK ASPHALT BY SYRACUSE BRICK.

STREET.	Limits.	Length in feet.	Area in sq. yds.
Court street,	Main street westerly,		128

GRANITE BLOCKS BY WOOD BLOCKS.

Main street,	Liberty to Sharon, west side,		1,460
Main street,	Sharon to near Franklin and Emery,	545	2,920
		545	4,508

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year laid.
Belmont avenue,	Hall street westerly,	Catskill blocks,	1,362	1,211	1901
Belmont avenue,	Hall to Oakland,	Metropolitan blocks,	1,023	914	1903
Birnie avenue,	Hooker street northerly,	Johnsonburg blocks,	145	483	1906
Bridge street,	Main to Dwight,	Rock asphalt,	688	2,525	1900
Bridge street,	Main street, 493 feet westerly,	Bitulithic,	493	1,746	1905
Bridge street,	Water street to Old Toll bridge,	Granite blocks,	249	713	1907
Catharine street,	State to Bay,	Syracuse brick,	1,722	5,691	1900
Charles street,	Liberty to land of B. & A. R. R.	Granite blocks,	150	376	1903
Chestnut street,	Worthington to Lyman,	Granite blocks,	472	1,673	1895
Chestnut street,	Lyman to B. & A. R. R.,	Granite blocks,	256	1,471	1889
Chestnut street,	B. & A. R. R. to Linden st.,	Granite blocks,	1,640	5,235	1892
Chestnut street,	Linden to Carew,	Granite blocks,	773	2,156	1893
Chestnut street,	Carew to Allendale,	Syracuse brick,	1,015	3,432	1900
Chestnut street,	Allendale to Jefferson ave.,	Bitulithic,	825	2,898	1905
Court street,	Main to Court Square ave.,	{ Rock asphalt, Syracuse brick,	317	1,149	1897
		{ Syracuse brick,	—	174	1897
		{ Rock asphalt,	—	128	1907
Court square avenue,	Court to Elm st.,	{ Syracuse brick,	193	503	1897
Cypress street,	Main street westerly,	{ Syracuse brick, Granite blocks,	—	330	1897
			459	1,700	1904

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Cypress street,	Boylston to Fulton,	(Granite blocks,	216	848	1905
Dwight street,	State to Lyman,	Syracuse brick,	2,324	9,905	1896
East Court street,	Main to Market,	Rock asphalt,	117	297	1900
Elm street,	Main to Court Square ave.,	{ Rock asphalt,	343	949	1897
		{ Syracuse brick,	—	330	1897
Fort street,	Main to Water,	Granite blocks,	670	1,770	1895
Fulton street,	Cypress to Vine,	Granite blocks,	1,125	3,006	1906
Hampden street,	Main street westerly,	Bitulithic,	212	821	1904
Hampden street,	completion, Main to Water,	Bitulithic,	394	1,539	1905
Harrison avenue,	Main to Dwight,	Trinidad asphalt,	586	2,247	1896
Hillman street,	Main to Dwight,	Bitulithic,	648	2,025	1906
Liberty street,	Chestnut to Cass,	Syracuse brick,	1,399	4,571	1900
Liberty street,	Cass to Heywood ave.,	Syracuse brick,	1,147	3,971	1901
Lyman street,	Main to Chestnut,	Granite blocks,	1,305	4,599	1889
Main street,	Locust to Marble,	Syracuse brick,	840	4,381	1897
Main street,	Marble to William,	Syracuse brick,	1,762	8,307	1896
Main street,	William to Bliss,	Creo-resinate wood bl'ks, 3' x 3½' x 6" to 10",	1,150	6,460	1906
Main street,	Bliss to State,	Syracuse brick,	241	1,355	1893
Main street,	State to Worthington,	Creo-resinate wood bl'ks, 3' x 3½' x 8",	1,899	10,798	1904

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Main street,	Worthington to Hampden, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 8",	382	1,183	1904
Main street,	Worthington to Hampden, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8",	—	962	1903
Main street,	Hampden to Lyman,	Creo-resinate wood bl'ks, 4" x 4" x 8",	153	775	1903
Main street,	Lyman to Liberty,	Creo-resinate grooved, wood bl'ks, 4" x 4" x 8"	484	2,780	1903
Main street,	Liberty to Sharon, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8",	453	1,135	1903
Main street,	Liberty to Sharon, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	—	1,487	1907
Main street,	Sharon to near Franklin and Emery,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	509	3,103	1907
Main street,	near Franklin, east side,	Syracuse brick,	36	144	1907
Main street,	Franklin to Carew, east side,	Syracuse brick,	1,302	4,605	1897
Main street,	Emery to Sergeant, west side,	Catakill blocks,	1,447	5,449	1901
Main street,	crossing opposite Auburn street,	Catakill and Metropolitan blocks,	—	163	1903
Maple street,	Central to High,	Bitulithic,	1,563	5,665	1904

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Maple street,	High to State,	Bitulithic,	593	2,580	1905
Market street,	State to Harrison ave.,	Bitulithic,	988	1,887	1906
North Main street,	Plainfield to Morgan,	Bitulithic,	730	4,485	1906
Plainfield street,	Sargeant to Fulton,	Syracuse brick,	1,710	10,249	1902
Railroad street,	Main to Water,	Granite blocks,	516	1,539	1906
Sanford street,	Main to Market,	Rock asphalt,	102	207	1900
State street,	Main to library,	Granite blocks,	1,019	4,034	1890
State street,	Dwight to Chestnut (widened),	Granite blocks,	—	217	1896
State street,	Federal to Oak,	Syracuse brick,	847	4,590	1897
State street,	at St. James ave.,	Syracuse brick,	—	183	1907
State street,	Sherman to Highland Div.,				
	N. Y., N. H. & H. R. R.,	Bitulithic,	890	4,352	1905
Summer street,	Spring to near Autumn st.,	Granite blocks,	567	1,512	1907
Summer street,	Autumn to Kibbe ave.,	Granite blocks,	1,259	4,029	1895
Summer street,	Kibbe avenue to point 85' west of Federal,				
Taylor street,	Main to Dwight,	Granite blocks,	787	2,635	1901
Walnut street,	State to Union,	Bitulithic,	770	2,580	1904
Walnut street,	Union to Pendleton avenue,	Syracuse brick,	638	2,144	1899
Walnut street,	Pendleton ave., to Lebanon st.,	Syracuse brick,	873	3,140	1900
Walnut street,		Bitulithic,	1,195	3,888	1905

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Walnut street,	Lebanon to Hancock,	Bitulithic,	1,005	3,334	1906
White street,	Allen to Orange,	Syracuse brick,	1,610	2,400	1902
Worthington street,	Main to Dwight,	Syracuse brick,	739	2,544	1896
Worthington street,	Dwight to Fairbanks place,	Syracuse brick,	1,060	3,869	1901
Worthington street,	Fairbanks place to east line of Spring,	Syracuse brick,	269	1,003	1903
Worthington street,	Main to Cook's ave.,	Bitulithic,	404	1,418	1905
Total			52,970	198,907	

RECAPITULATION.

Material.	Length in feet.	Area in sq. yds.	Material.	Length in feet.	Area in sq. yds.
Bitulithic,	10,620	39,168	Metropolitan blocks,	1,023	996
Catakill blocks,	2,809	6,741	Rock asphalt,	1,760	5,630
Creo-resinate wood blocks,	5,030	28,683	Syracuse brick,	19,534	77,446
Granite blocks,	11,463	37,513	Trinidad asphalt,	586	2,247
Johnsonburg blocks,	145	483			
Total				52,970	198,907

RECAPITULATION.

MATERIAL.	Length in Feet.	Length in Miles.	Area in Square Yards.
Wood block,	5,080	.953	28,683
Granite block,	11,463	2.171	37,513
Syracuse brick,	19,534	3.700	77,446
Rock asphalt,	1,760	.333	5,630
Trinidad asphalt,	586	.111	2,247
Catskill block,	2,809	.532	6,823
Metropolitan block,	1,023	.194	914
Bitulithic,	10,620	2.011	39,168
Johnsonburg vitrified brick,	145	.027	483
Total,	52,970	10.032	198,907

STREETS MADE PUBLIC.

Name.	Limits.	Length in feet.	Width in feet.
Clantoy street,	Phoenix street southeasterly,	1,250	50
Donald street,	North Main street to Birnie avenue,	444	50
Franklin street,	Murray Hill avenue to Nursery street,	248	50
Logan street,	King to Alden street,	1,167	48
Malden street,	Allen to Grand street,	873	50
Oakland street,	Belmont ave. to Sumner ave.,	716	60
Old Bay road,	Berkshire st. to Boston road,	1,830	50
Pecousic avenue,	Near Mill river to Main street (at Leary's line),	2,654	100
Phoenix street,	Liberty street northeasterly,	570	50
Pineywoods avenue,	Forest Park avenue to Forest Park,	2,110	60
Reed street,	State st. to Wilbraham road,	654	54
Ridgewood terrace,	Union to Mulberry street,	861	18 to 30
Shattuck street,	Oak Grove avenue to Cortland street,	1,214	50
Silver street,	Armory street easterly,	500	50
Westernview street,	Mountainview st. to Forest Park avenue,	615	50
		15,706	

STREETS WIDENED.

Name.	Limits.	Length in feet.	Width in feet.
Chestnut street,	Montmorenci to Springfield street,	1,712	80
*Main street, I. O.,	Ludlow avenue to Wilbraham line,	298	66
Pecousic avenue,	North and south at Mill river,	754	100
Springfield street,	Chestnut street to a by-road,	1,895	80
		4,659	

*Widened by the County Commissioners.

BRICK AND CONCRETE SEWER CONSTRUCTION 1907.

STREET AND LOCATION.	Material.	Size and Shape.	Length in Feet.	Total Cost.*	Cost per Lin. Foot.	Average Depth of Cutting in Feet.	Materials Excavated.
* Belmont ave., Lawndale to Woodlawn	Brick and concrete	3'-0" x 4'-6" elliptical	245				
	Brick and concrete	2'-10" x 4'-3" elliptical	416	\$3,470.41	\$5.10	14.7	Sand, water
	Concrete	2'-8" circular	989				
Carew st., Prospect to Arm'y	Concrete	2'-6" x 3'-9" egg shape	1,365	8,487.12	3.60	9.5	Clay, water
	Concrete	2'-0" x 3'-0" egg shape	90	447.63	4.97	12.0	Sand
Longhill st., Main st.	Concrete	2'-4" x 3'-6" egg shape	191	1,077.51	5.64	13.0	Clay, hardpan, water
Main st., Pecosic ave. to Longhill	Concrete	2'-0" x 3'-0" egg shape	741	3,051.53	4.12	10.2	Clay, hardpan, water
Oak st., Union to State st.	Concrete	2'-8" x 4'-0" egg shape	327	2,061.84	6.30	13.0	Sand
Pecosic ave., Mill river to Main st.	Concrete	2'-2" x 3'-3" egg shape	648	3,402.82	5.25	16.0	City dumping ground
Plainfield st., Rowland ave., Sanderson ter.	Concrete	2'-2" x 3'-3" egg shape					Sandy loam, water
Total			5,012	\$21,998.85			

* Brick arch and concrete invert.

CLAY PIPE SEWER CONSTRUCTION, 1907.

NAME OF STREETS.	LIMITS.	Size in Inches.							Total Length in Feet.	Total Cost of Sewer.	Cost per lin.ft.	Average depth in ft.	Materials Excavated.
		24"	20"	18"	15"	12"	10"	8"					
Army at.	Crew st. to Truant school.	462						803	1,255	\$1,066.91	\$0.85	8.5	Sand
Beaumont st.	Belmont ave. to Sumner ave.							264	264	161.92	.61	7.0	Sand
Berkshire st.	Grenada ter. to Alderman st.							345	345	282.07	.82	8.2	Sand
Birmingham st.	Extension easterly.							61	61	84.38	1.37	7.8	Sand and gravel
Birnie ave.	" " Medford st. southerly							188	188	158.66	.94	6.9	Clayey marl
Bowdoin st.	Oakland st. easterly	700	361					285	861	1,287.86	1.49	12.0	Sand, water
Bowdoin st.	Extension southerly to Lincoln st.							490	285	3,711.57	1.30	8.4	Sand, water
Crew st.	Liberty st. to Sherman road							434	1,435	1,601.27	1.04	9.2	Sand, water
Chapin ter.	Chapin st. easterly							602	606	1,124.82	1.85	9.0	Clayey loam, water
Commerce st.	Garden brook to near Main st.							327	319	705.44	2.21	8.5	Clayey loam
Commerce st.	Extension southerly							64	64	24.74	.39	6.0	Sand
Commerce st.	Belmont ave. to Sumner ave.							524	824	467.07	.87	7.2	Sand
Commerce st.	Completion of 1908 work							344	344	1,045.03	.77	13.6	Sand
Commerce st.	Extension to Pomona st.							233	449	1,414.56	.77	8.4	Sand
Commerce st.	Dickinson st. to Belmont ave.							216	774	698.29	.90	8.5	Sand
Commerce st.	thall st.							186	837	823.06	.98	8.5	Sand
Commerce st.	Kenwood ter.							350	415	276.91	.67	7.0	Sand
Commerce st.	Liberty st.							218	1,901	2,101.62	1.75	11.0	Sand, water
Commerce st.	Logan st.							97	97	109.36	1.13	7.0	Sand
Commerce st.	Longhall st.							327	327	365.41	1.11	9.9	Sand
Commerce st.	Cherryvale ave. to Spruce land ave.							635	635	1,298.32	.83	8.3	Clay, hardpan
Commerce st.	Main st. to near Warner pl.							620	630	1,154.42	.83	8.5	Sand
Commerce st.	Sumner ave. to Spruce land ave. east.							621	631	575.75	.92	8.6	Sand
Commerce st.	" " " west.							270	568	1,310.46	2.13	13.9	Fire yellow sand
Commerce st.	Cypress st. to Emery st.							212	739	1,055.75	1.48	8.0	Sand and gravel
Commerce st.	Healdy st. e'y thence n'y to near Chilcopee river							290	260	254.89	.98	7.0	Sand and gravel
Commerce st.	Packer st. westerly							304	600	580.96	.97	8.0	Sand
Commerce st.	Wilbraham road southerly							221	501	446.41	.80	9.2	Sand
Commerce st.	Sumner ave. to Garfield st.							297	297	304.92	.60	9.0	Sand
Commerce st.	Grenada ter. southerly							317	249	312.13	1.25	10.5	Sand and gravel
Commerce st.	Main st. southerly							347	647	468.68	.72	8.5	Sand
Commerce st.	White st. to Pomona st.							367	643	601.41	.57	7.5	Sand and loam
Commerce st.	Glenwood sewer easterly to Springfield st.							450	367	299.65	.57	8.0	Sand and loam
Commerce st.	Grenada ter. to Alderman st.							437	1,287	1,348.57	1.04	8.7	Clayey loam, sand
Commerce st.	Longhall st. easterly							82	450	43.01	.91	8.2	Sandy loam
Commerce st.	Relaying west of Water st.							293	82	53.01	1.00	8.0	Sandy loam
Commerce st.	State st. to State st.							300	603	506.80	1.16	9.5	Sand
Commerce st.	State st. to Ripley pl.							123	781	906.01	1.16	8.0	Sand
Commerce st.	Wilbraham road southerly							300	300	294.08	.98	9.0	Sand
Commerce st.	Extension southerly							297	297	40.42	.23	6.5	Sand
Commerce st.	" southerly							297	297	40.42	.23	6.5	Sand
Commerce st.	" westerly							104	297	119.58	1.15	6.8	Sand
Commerce st.	" easterly							349	349	435.88	1.25	8.5	Sand and gravel
Total		136	706	1679	1641	7169	6703	414	21,728	\$25,074.15			

* Incomplete. † Storm water only. * 1,409' of 4" underdrain. † 1,189' of 6" underdrain and 229' of 4" underdrain. = 38% of 4" underdrain.
Arain. † 1,069' of 6" underdrain. = 12% of 6" underdrain and 440' of 4" underdrain. = 52% of 4" underdrain.

*COST OF SEWER SYSTEM TO NOV. 30, 1907.

YEARS.	CONSTRUCTION.	MAINTENANCE.	TOTAL.
1863-1880 inclusive	\$357,163 72	\$38,178 38	\$395,342 10
1881	43,902 05	2,359 29	46,261 34
1882	28,891 33	3,089 25	31,480 58
1883	26,573 85	4,089 33	30,613 18
1884	36,035 22	2,929 25	38,964 47
1885	29,199 74	2,477 23	31,676 97
1886	25,313 73	2,541 81	27,855 54
1887	33,967 31	2 376 47	36,343 78
1888	30,872 07	3,951 21	34,823 28
1889	24,123 38	6,056 46	30,179 74
1890	20,722 73	10,004 42	30,727 14
1891	25,568 51	6,412 75	31,981 26
1892	27,381 84	6,823 51	34,205 35
1893	25,743 24	8,553 66	34,296 90
1894	27,142 60	7,236 53	34,379 22
1895	23,905 82	7,598 31	31,504 13
1896	45,299 89	8,634 30	53,934 19
1897	33,976 14	8,790 00	42,766 14
1898	47,751 26	6,986 99	54,738 25
1899	51,246 07	8,594 56	59,840 63
1900	140,380 89	9,862 21	150,243 10
1901	80,276 02	13,272 25	93,548 27
1902	38,904 19	12,909 40	51,813 59
1903	29,169 75	9,084 88	38,204 63
1904	46,339 05	12,916 69	59,255 74
1905	40,831 47	9,620 62	50,452 09
1906	24,419 73	12,444 00	36,863 73
1907	47,977 73	10,797 97	58,775 70
	\$1,412,579 31	\$238,441 73	\$1,651,021 04

*Does not include cost of connections to buildings nor street inlets.

*PRECIPITATION FOR CALENDAR YEAR, 1907.

Month.	Total in Inches	Greatest Amt. in 24 hrs.	Dates.	Storms in which the Precipitation exceeded $\frac{1}{2}$ inch per hour.	Max. Rate per Hour, Inches.	Duration of Max. Rate, Minutes.
Jan.	2.74	.33	19	May 16, .63 inches in 1 $\frac{1}{2}$ hours	.51	20
Feb.	3.04	.25	4 & 5	" 27, .37 " " "	3.08	5
March	1.26	.44	13 & 14	June 25, .26 " " "	1.56	5
April	4.39	.86	23 & 24	" 26, .60 " " "	1.62	10
May	3.77	1.72	16 & 17	July 11, .16 " " "	.75	8
June	3.60	.79	29 & 30	" 20, .14 " " "	.84	10
July	1.76	.89	11 & 12	Aug. 2, .31 " " "	1.62	10
Aug.	1.39	.46	24	Sept. 11, .16 " " "	.64	15
Sept.	8.27	3.31	23	" 23, 1.31 " " "	1.15	50
Oct.	5.36	1.74	27 & 28	Oct. 8, .41 " " "	1.10	12
Nov.	4.34	2.00	6 & 7	" 29, .26 " " "	.68	15
Dec.	3.59	1.23	10 & 11	Nov. 2&3, .40 " " "	1.50	12
Total	44.11					

*Includes rain, melted hail, sleet and snow.

Number of days in which the precipitation exceeded .01 of an inch,	120 days
Number of days during which snow fell,	26 days
Date of last snowfall in spring,	April 19
Date of first snowfall in fall,	Nov. 14
Highest river and date,	Nov. 8, 13.5'
Lowest river and date,	Aug. 20, 3.2'
Annual range of river,	12.3'
Mean daily height of river,	6.05'
Greatest 24-hour rise and date,	Oct. 30, 4'
Greatest 24-hour fall and date,	Nov. 10, 2.5'

GENERAL STATISTICS.

CITY OF SPRINGFIELD, MASS., NOVEMBER 30, 1907.

Springfield is situated on the east bank of the Connecticut river, in latitude 42° 06' north, longitude 72° 35' west, at an elevation above sea level of from 65 to over 215 feet.

Zero of "City Base" is 27.1 feet below sea level.

State street, at corner of Main street, is 65.9 feet above sea level, or 93 feet "City Base."

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner avenue, at corner of Belmont avenue, is 187.9 feet above sea level.

Population, estimated May 1, 1907,	80,329
Number of voters: men, 13,688; women, 329; total,	14,017
Number of polls,	22,568
School enrollment: public, 13,796; parochial, 1,960; total,	15,756
Greatest extent of city, north and south,	5.9 miles
Greatest extent of city, east and west,	8.9 miles
Connecticut river frontage,	4.65 miles

Area, including those portions covered by water, approximately, 24,661 acres

Area by wards: Ward One, 1,733.6 acres; Two, 225.7 acres; Three, 234.8 acres; Four, 413.2 acres; Five, 400.6 acres; Six, 327.4 acres; Seven, 2,197.7 acres; Eight, 19,128.3 acres.

Total park areas, 512.17 acres; Forest Park, 476.10 acres.

Area taxed, 16,185 acres; tax rate, \$15.00 per \$1,000.

Valuation,	Real estate,	\$73,324,920	} \$91,824,750
	Personal,	18,499,830	

		Square yards.	
Public streets accepted to Nov. 30, 1907,	} 151.45 miles.	Wood block,	28,683 .96 miles
		Granite block,	37,513 2.17 miles
		*Syracuse brick,	77,446 3.70 miles
		Sheet asphalt,	7,877 .44 miles
		Other brick pavers,	8,220 .75 miles
		Bitulithic,	39,168 2.01 miles
		Macadam,	. 60.40 miles
		Gravel or dirt,	. 81.02 miles

Sidewalks laid in public streets to Nov. 30, 1907, 160.44 miles

*Does not include brick pavement in railway tracks around Court Square.

Electric railways (double track counted twice),	51.65 miles
Steam railroads,	<div> <div>Four tracks, about</div> <div>Double tracks, about</div> <div>Single track, about</div> </div> <div> <div>4.5 miles</div> <div>7 miles</div> <div>11 miles</div> </div>
Water mains,	160.42 miles
Gas mains,	119.69 miles
Sewers, 110.778 miles,	<div> <div>Brick sewers,</div> <div>Vitrified clay pipe,</div> <div>Cement pipe,</div> <div>Brick, stone and plank,</div> <div>Wood pipe,</div> <div>Cast iron,</div> <div>Concrete,</div> <div>Brick-concrete,</div> </div> <div> <div>27.257 miles</div> <div>56.857 miles</div> <div>25.042 miles</div> <div>.441 miles</div> <div>.193 miles</div> <div>.028 miles</div> <div>.835 miles</div> <div>.125 miles</div> </div>
Street lights, arc,	1,040
Street lights, incandescent,	62
Houses,	12,560
Schoolhouses,	34
Churches,	51
Post offices,	4
Police stations,	2
Railroad stations,	7
Engine houses,	12
Steam fire engines,	8
Spare engines,	1
Chemical engine and hose wagons,	13
Ladder trucks,	4
Aerial trucks,	2
Water towers,	1
Motor auxiliaries,	2
Automobiles, Chief and Dep. Chief,	2
Trolley transportation car,	1

CITY EXPENDITURES.

City Engineer's department,	\$11,132.66
Fire department,	155,681.69
Forestry,	15,263.20
Street department,	<div> <div>Maintenance,</div> <div>Paving,</div> <div>Macadam and gravel,</div> <div>Sidewalks and curbing,</div> </div> <div> <div>\$139,420.46</div> <div>44,866.51</div> <div>41,666.54</div> <div>23,627.06</div> </div>
Sewer department,	52,118.30
Police department,	105,736.92
Public parks,	37,997.90
Street lighting department,	78,245.50
Water department,	259,629.29
School department,	375,095.21
Pauper department,	44,633.30
Scavenger department,	20,052.18
Collection of ashes,	28,987.00

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Annual Report

★ City Engineer

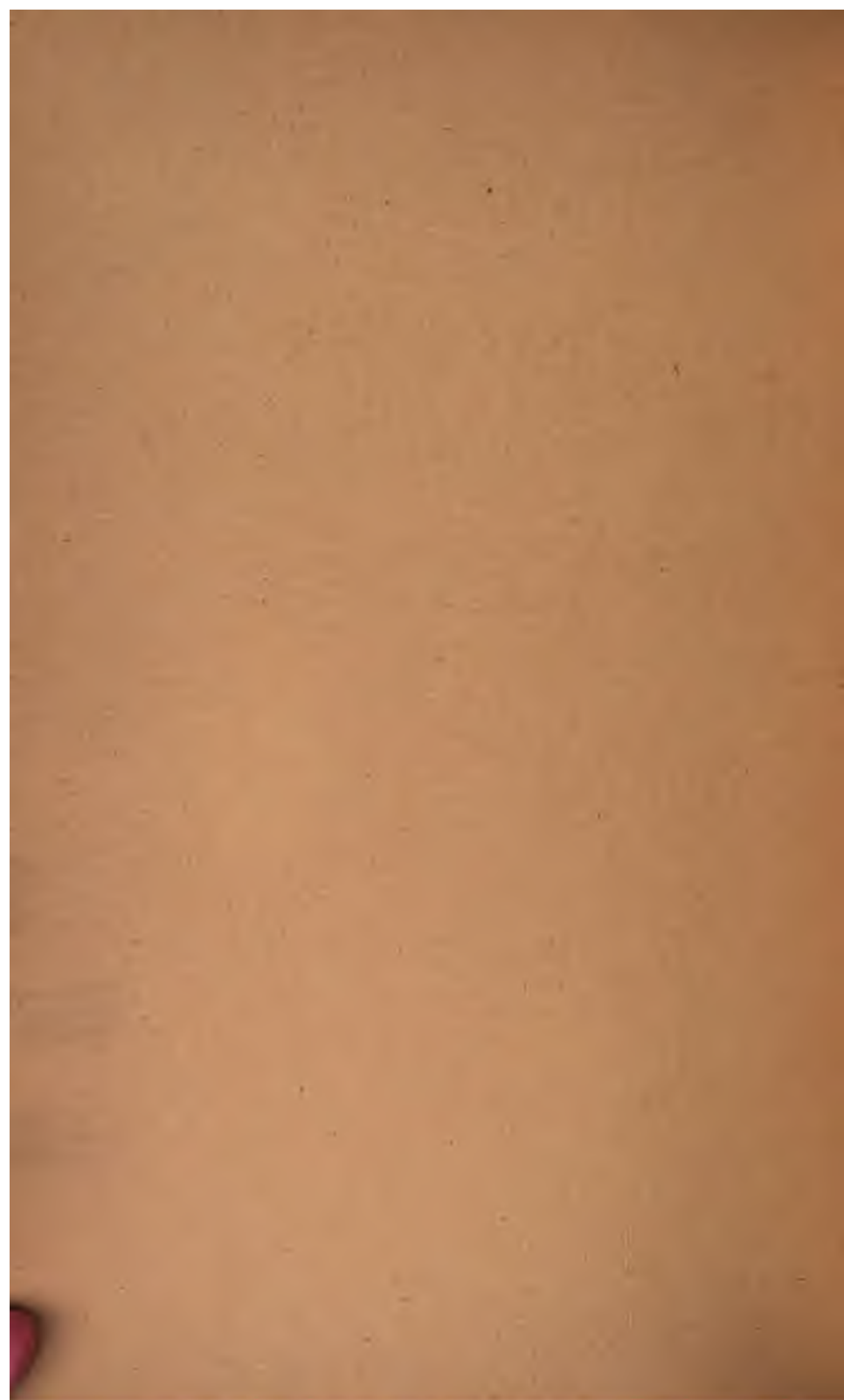
Springfield

Mass.



For the Year 1908

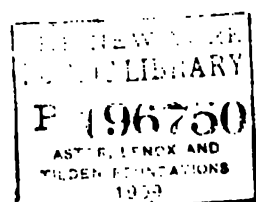
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REPORT OF
CITY ENGINEER

CITY OF SPRINGFIELD
MASSACHUSETTS

1908
B. B.



REPORT OF THE CITY ENGINEER.

CITY OF SPRINGFIELD, MASS., December 28, 1908.

To the City Council:—

The report of the operations of the Engineering Department for the fiscal year ending November 30, 1908, is herewith respectfully submitted.

FINANCIAL STATEMENT.

RECEIPTS.

Annual appropriation for the year 1908,...	\$10,000 00	
Receipts from other city departments,.....	2,801 51	
		<hr/>
		\$12,801 51

EXPENDITURES.

Salaries of the City Engineer and assistants,	\$9,895 62	
Office rent and lighting,.....	567 13	
Drawing materials, stationery and general supplies,	453 75	
Car fares, automobile service and sundry office expenses,.....	1,155 53	
		<hr/>
		\$12,072 03
		<hr/>
Balance unexpended,.....		\$729 48

DESCRIPTION OF EXPENDITURES.

ENGINEERING DEPARTMENT.

For all services performed on account of matters referred to the Board of Public Works by the City Council relating to

the laying out or alteration of streets, sidewalks, sewers, and parks; for surveys and levels, plans and profiles, estimates of cost, releases from damages, reports to the City Council, and general correspondence relating to matters referred to the Board, and all clerical work performed relating to public hearings and all meetings of the Board; measuring and assigning house numbers, work upon house number books and records, and making new plans; furnishing street lines and grades to individuals for buildings, grading, fencing, and sidewalk construction; surveys, estimates, and all general services performed for the various committees of the City Council; general map, plan, and profile drawing of streets, sewers, and public property for office records and for future reference; measuring and recording all sewer connections for house drains, and furnishing lines and grades; preparation of plans for the City Solicitor's use; survey and plan for purchase of proposed lot for Police building; expert service, inspection of North and South End bridges to determine safety; surveys, plans, and estimates, lines and grades for extension of Pecousic avenue; indexing plans and other records; photographing and blue-printing, examination of deed records, setting of street monuments, and all other services not charged to other city departments, the sum of \$6,974.06

HIGHWAY DEPARTMENT.

For all services performed on account of and charged to the street work appropriation; estimates and plans, lines and grades for paving, macadam, and gravel, final measurements, and all other incidental work, the sum of \$352.71

SIDEWALK AND CURBING DEPARTMENT.

For all services performed for the general sidewalk and curbing appropriation: lines and grades for laying out and construction, measurements for assessments, and all work incidental thereto, the sum of \$336.95

SEWER DEPARTMENT.

For all services performed on account of the general sewer appropriation and the drainage of Kibbe Hollow; plans, estimates, laying out of work and general supervision of construction details, and all other incidental work the sum of \$868.72

WATER DEPARTMENT.

For all services performed for the Water Department; running street lines for laying new mains, and all incidental work, the sum of \$6.47

ASSESSORS' DEPARTMENT.

Surveys and plans, computations for plans of private property and examination of deed records, the sum of \$649.62

PARK DEPARTMENT.

For all services performed for the Park Department; surveys and plans for the Emerson Wight playground at South End and other miscellaneous work, the sum of \$43.51

WATERING STREETS ACCOUNT.

Lengths and widths of roadways for assessments, the sum of \$1.50

CHESTNUT AND SPRINGFIELD STREETS WIDENING.

Lines and grades and setting street monuments and other incidental work, the sum of \$1.50

CHESTNUT STREET SCHOOLHOUSE ADDITION ACCOUNT.

Surveys and plans for additional land, the sum of \$28.05

HOWARD STREET SCHOOLHOUSE ADDITION ACCOUNT.

For services performed on account of the Howard Street Schoolhouse addition; giving lines and grades for walks, the sum of \$2.38

City Engineer's Report.

KENSINGTON AVENUE SCHOOL ACCOUNT.

Plans, blue-prints, looking up deeds; survey of lot, grading and sidewalk grades, the sum of \$74.50

INDEPENDENCE DAY FUND.

Staking out racing course for Fourth of July athletic sports, the sum of \$20.88

KIBBE HOLLOW DRAINAGE.

Work in connection with drainage of private property in Kibbe Hollow, ordered by the Board of Health; expense charged to Sewers and Drains account.

POLICE DEPARTMENT.

Maps showing boundaries of different beats for different squads, also location of signal and fire alarm boxes; photographs of automobile course, the sum of \$33.00

LAW DEPARTMENT.

Measurements and evidence for prosecuting claims on account of defective sidewalks, the sum of \$11.41

FIRE DEPARTMENT.

Survey of lot and setting boundary marks for boundary lines at the Chestnut street engine house, the sum of \$3.44

ABBE AVENUE OVERHEAD CROSSING ACCOUNT.

Lines and grades for construction of approaches; inspection of new bridge structure and detailed description; laying out concrete stairways and all other incidental work, the sum of \$159.46

PECOUSIC AVENUE RELOCATION AND IMPROVEMENTS.

Inspection and general supervision for erection of new concrete bridge structure over Mill river, the sum of \$62.79
(Inspection charged to the account directly.)

MILITIA RIFLE RANGE ACCOUNT.

Surveys and plans for land purchased at Chicopee Falls for Militia Rifle Range; setting monuments; plans and specifications for construction of new targets, the sum of \$93.75

MUNICIPAL BUILDING ACCOUNT.

Surveys, plans, photographing on account of site and buildings for proposed Municipal Building, the sum of \$76.77

RIVER FRONT IMPROVEMENT. (PROPOSED.)

Maps, photographs, and general information for the use of River Front Commission, the sum of \$91.40

PAVING, STREETS, SIDEWALKS, AND CURBING.

The usual work has been performed for the Street Department, cost of which appears under the proper heading in this report, and covers all work performed under general construction.

PAVING.

The appropriation for this work being limited, the amount of work performed was less than usual. The new work was in the main covered by the paving of State street between Main and Dwight streets. The old granite block pavement laid on a sand bed about 1890 had become uneven and noisy, and the general satisfaction resulting to the Main street business houses from the paving of that thoroughfare with wood blocks was a sufficient reason for the adoption of the same material in State street. 2403 square yards of creosote-resinate gum wood blocks were laid at a total cost of \$7,850.16 or at the rate of \$3.27 per square yard. The blocks were laid on a four and one half

inch Portland cement concrete base with an intervening cushion coat one half inch in thickness, made of a dry Portland cement mortar. After the blocks were laid and rolled to surface the joints were filled with a Portland cement mortar grout. The entire roadway between curb lines was paved, including the space covered by double track street railway. The blocks were purchased in the usual way from the United States Wood Preserving Company and laid by days' labor furnished by the Street Department.

STREET RAILWAY TURNOUTS.

The franchises granted the Street Railway Company in 1907 for double track turnouts in Worthington and King streets required the paving of the whole space from curb to curb for the length of the turnouts, with vitrified brick on concrete, the cost to be borne by the company. The abutters protested against the use of the brick pavement on account of the noise and it was finally agreed between the Street Railway Company and the City that wood blocks should be substituted, with some concessions to the company on account of the extra cost of the wood pavement. The turnouts were paved with the wood blocks and the work performed by the Street Department, the Street Railway Company bearing its share of the cost.

After the laying of the wood pavements a result was experienced unlike that heretofore met, a swelling of the blocks due to presence of moisture caused a slight warping and upheaving of the work in places, necessitating a small amount of relaying. This was explained by the parties who furnished the blocks as due to the excessive application of water to the blocks that had been subjected to a prolonged drying process prior to laying.

The wood block pavement, although more costly than any other kind used in the city, continues to meet the approval and general satisfaction of our citizens to a degree not found in any other form of pavement. The general expression of the public

regarding any form of paving material is a good indication of its quality desirable or otherwise.

BITULITHIC PAVEMENT.

No bitulithic paving has been laid during the year and most of that heretofore laid has been repaired where defects were such as to cause inconvenience to the traveling public. Evidently just the right composition and mode of laying has not yet been perfected with this form of paving that will insure its successful use on all occasions. That first laid in the city in 1904 is now in excellent condition, and was laid by the Messrs. Warren Bros. under contract. Subsequent work laid by the city, with plant, material, and skilled workmen furnished by the Warren Bros. has not succeeded as well.

The pavement of this variety first laid in Maple street is highly satisfactory, and admirably resists the effects of traffic as well as our rigorous New England climate.

DUST LAYING AND SURFACING.

The Street Department has made considerable experiment with the preparation offered by various parties for the prevention of dust and preservation of the surface to our macadam and gravel streets. Some of these experiments were reasonably successful; others show doubtful efficiency. The efforts in this direction are certainly commendable and should not be discouraged by partial failure in first attempts. The advocates of coal tar and asphalt products are both to the front with their preparations for use as dust layers and street surface preservatives, and it is anticipated that the future will develop more perfect results.

BRICK PAVEMENTS.

This city, during recent years, has made quite large use of various forms of vitrified brick for paving streets and, as the

first pavements laid involved the best materials known, the results have been reasonably satisfactory. The first vitrified brick pavement laid in 1892 on Main street, between State and Bliss streets, the first section of pavement in this city laid on a concrete base, is in good surface at the present time, and the brick shows only slight wear upon the corners. It is doubtful if any other variety of pavement now in use after sixteen years of such service would make as good showing as this section of pavement. In the meantime it has afforded a sanitary pavement with smooth surface, convenient and safe for all forms of traffic, and with the constant tendency towards a greater proportion of motor-drawn vehicles as compared with the number drawn by horses, the slight objection to this kind of material on account of noise, as compared with wood or asphalt, becomes diminished.

There are other sections of brick pavement laid in the city that have not shown as well, illustrating the necessity of great care in the selection of this material to secure a uniformly good product, hard enough to resist abrasion and wear, yet not so hard as to be brittle.

SIDEWALKS.

The sidewalk construction about the city, it is believed, compares favorably with the walks in other cities; with the increase of public streets the amount of sidewalks are rapidly increasing as well as the necessity for added surveillance to maintain safe and convenient sidewalk surfaces for the use of pedestrians.

Coal tar concrete of good quality, as laid by the city under recent specifications, continues to meet the approbation of our citizens for residential streets. This material has met some opposition in recent years from some property holders inexperienced in such matters, because of the inferior quality of workmanship and material furnished by parties engaged in the

development of real estate when first cost was the main and controlling element.

It is perhaps unfortunate that the city has no authority in this and kindred matters relating to the opening up and development of private streets, the exercise of which would result in a considerable saving to individual property owners who find themselves burdened with the maintenance of sidewalks poorly constructed or otherwise, who have bought houses upon private streets, in good faith, and who frequently find themselves almost invariably confronted with a bill for sidewalk renewal or repairs not anticipated.

There is a growing use of Portland cement concrete for sidewalks, and if good materials and workmanship are employed great durability and satisfaction result. There is some objection to this material as generally used, because of excessive smoothness, which, in snowy and icy weather, becomes treacherous for pedestrians. This department has repeatedly directed attention to this undesirable condition and the method of avoiding the same, but has no authority over the average property owner engaged in the construction of sidewalks of this material.

CURBING.

The use of Portland cement concrete, with its great variety of applications to construction work in general, lends itself to curb laying as well as sidewalk construction. In sections of the country where natural rock is unobtainable large use has been made of concrete, its use extending over a term of years sufficient in duration to fully demonstrate its adaptation to curb work. It is considered that in view of probable money saving as well as the general satisfaction resulting from the use of cement concrete for curbing, some investigation and study should be made to ascertain if it is expedient to adopt this material.

SEWERS AND DRAINS.

The work accomplished during the year in sewer construction has been more than usual, in view of the amount of larger sewers laid. For all but the smaller sizes, the use of Portland cement concrete has been extended with most satisfactory results.

CYPRESS AND FERRY STREETS.

The work contemplated for several years of constructing a large auxiliary sewer to relieve the Ferry street basements from flooding during heavy storms, has been undertaken and completed in a satisfactory manner, the new sewer extending from the shore of Connecticut river to the foot of the steep hill at easterly end of Ferry street, intercepting the flow of the Garden Brook sewer at the crossing of the two sewers in Ferry street. The sewer was built entirely of concrete, wood and collapsible steel forms having been used in the work, the size of the largest section at Connecticut river being 4 feet 10 inches by 7 feet 3 inches inside.

A petition is now pending with the Board of Public Works for the extension of the sewer into Connecticut river by a submerged outlet discharging into deep water. The completion of this sewer affords relief for the low lying section of Ferry street, heretofore greatly inconvenienced by flooding of basements on account of which some litigation resulted, with court decisions favorable to the city.

UNION STREET.

The condition of the old sewer in Union street, especially the part on the steep grade between Dale and Mulberry streets, has for a long time been a standing menace and the old work so badly disintegrated in places, that trouble has been anticipated as the result of the strain produced by excessive storm water

discharge. It was therefore recommended by the Board of Public Works that the sewer should be replaced by new construction of the modern type. A new sewer has been constructed of cement concrete from Main street sewer to the top of the hill at Mulberry street and a connection made at the end of the new work with the old sewer. The work as ordered is to extend easterly to Oak street but was terminated at Mulberry street for the season on account of the winter weather. Its extension will affect a relief of the section drained by the Oak and State street sewers, which for some years has been subjected to annoyance from sewer flooding.

STATE STREET.

The State street sewer has been extended easterly to Oak street from the termination of former construction at the New High School thereby affording a substitute for the old State street sewer that for many years has called for frequent attention and repairs by reason of faulty construction.

Aside from the sewer construction above outlined of cement concrete there has been the usual amount of vitrified clay pipe sewers, a tabulation of which, giving lengths, sizes and cost, is submitted with this report, the table covering also the sewers laid with concrete.

NEW STREETS LAID OUT, WIDENED, OR RELOCATED.

The table at the end of this report gives the streets made public during the year; also those widened or relocated as well as their length and width. Some of the more notable streets are briefly mentioned in the following.

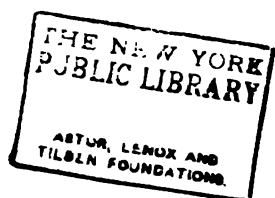
MAIN STREET, INDIAN ORCHARD.

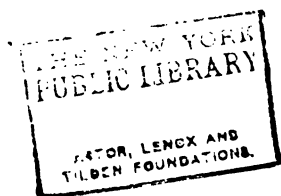
Main street, Indian Orchard, where it passes the high bank near the Chicopee river has not been quite satisfactory to the

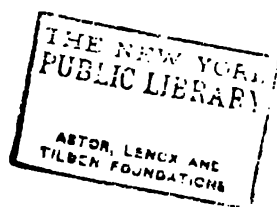
traveling public by reason of its several curves at this point, which made the thoroughfare rather tortuous. A petition was first made to the County Commissioners for a finding thereon, but as the proposed alteration lay entirely in Springfield and did not connect directly with the changes proposed for the same thoroughfare in the town of Wilbraham, it was decided that the City Council of Springfield had sole jurisdiction and after the usual preliminaries an order was passed for the relocation and straightening of the way. The work of grading was carried out in the late winter season, the changes in the street railway tracks, curbing, sidewalks, and macadam roadway having been deferred until spring, after the disappearance of frost. This change places the thoroughfare in much better shape for the public use.

PECOUSIC AVENUE EXTENSION.

The extension of Pecousic avenue from Gardner to York street, forming a part of the new boulevard one hundred feet wide, the laying out and construction of which has been carried along progressively for several years, leading through the southerly portion of the city, has been carried out in the main, and the necessary land and buildings acquired, the order for the work having passed the City Council early in August. The disposition of buildings and surplus land that had been purchased outright by the city was not effected until the late fall season. The buildings are now being removed from the line of the avenue and a macadam roadway has been constructed between Gardner and Norwood streets. Much time was spent by this department during the preliminary stages of the undertaking in working up the necessary options and releases for the taking of land and buildings, it being the custom that all such agreements and general understandings shall be obtained and sent in with the advisory report of the Board of Public Works prior to its acceptance and adoption by the City Council. Nego-









ABBE AVENUE CROSSING OVER BOSTON & MAINE RAILROAD.
CONSTRUCTED 1907-8.
VIEW LOOKING NORTHEASTERLY.



ABBE AVENUE CROSSING OVER BOSTON & MAINE RAILROAD.
CONSTRUCTED 1907-8.
VIEW LOOKING NORTHWESTERLY.

tiations were effected with the owners of fifteen different properties, eight properties having been purchased outright by the city previously during an interval of ten years. Good progress is now being made in the removal of buildings on line of the work, that were sold to individuals, and by spring the way will doubtless be cleared so that a suitable roadway can be made that shall provide for the necessity of the public. The completion of this section and the erection of the new bridge over Mill river completes the new boulevard from the lower end of Water street to the portion now under the control and jurisdiction of the Board of Park Commissioners, which extends from the Leary brick yard property to the Longmeadow line.

CLINTON STREET NEW APPROACHES TO FULTON STREET.

The new approaches north and south connecting with Fulton street, from the Clinton street underpass at the Boston and Maine railroad, has been completed during the winter season, according to the mutual agreement entered into by the city and the Boston and Maine railroad. The railroad company agreed to bear all cost and carry out the entire work, in view of the general improvement in freight facilities. The two inclined approaches to Fulton street required retaining walls throughout their entire length with iron pipe railings and the approaches as well as the underpass under the railroad were paved with granite blocks.

ABBE AVENUE CROSSING OVER BOSTON AND MAINE RAILROAD.

The work of providing a new overhead crossing of the Boston and Maine railroad on line of Abbe avenue has been completed, the preliminaries for the work and a part of the construction having been carried out during the year 1907. A contract with the Boston Bridge Works was made for the erection of the new bridge structure, the concrete abutments

having been constructed by the city Street Department during 1907. The new bridge has a clear span of 172.5 feet with a clear roadway of 24 feet and one sidewalk on the northerly side of the structure. The roadway was paved with creosinate wood blocks laid on a kyanized spruce underfloor, with an intervening cushion coat of Portland cement mortar.

The filling of the earth approaches was let to F. T. Ley & Company, who carried out the work for the most part during the winter season of the present year. The completion of this work furnished a very important crossing of the Boston and Maine railroad that has been anticipated for many years, it being the only public crossing of the railroad in Brightwood, between Plainfield street and the Chicopee line.

BOARD OF PUBLIC WORKS.

The Board in its advisory capacity has attended to the usual number of petitions for street layouts and alterations, sidewalks, and sewers. The Board has held fifty-two meetings and hearings during the year. As the Board is expected to provide for all preliminary details in the various matters referred to it, much time must be expended in some of the more complicated matters to provide for these details. A large expenditure of time has been made for the extension of Pecousie avenue, ordered by the City Council in August of the present year, also the proposed layout of Albany street, from Armory street to St. James avenue, not yet ordered.

A report was made by the Board early in the season for the part of the location lying between Armory street and land of the Springfield Foundry Company as petitioned for by H. H. Bowman and others. The Board had for a long time tried to find a solution for the petition of C. H. Churchill and others, for the extension of the layout to St. James avenue, but many difficulties were met and no mutual agreement or understanding

could be reached with the parties in interest, through whose lands the layout was to pass. The Board therefore made report as above mentioned, which was received by the City Council and after further hearings and many conferences with the interested parties, it was finally arranged for the extension to St. James avenue in a substantially direct course. The report of the Board was therefore recommitted for further consideration and a report upon the extension. After due deliberation, the Board concluded, after conference with those in the City Council delegated to further the project by councils with the interested parties, that as the newly appointed River Front Improvement Commission might find that the land through which the location of Albany street is to pass, might be required for general railroad purposes in connection with the proposition to alter or increase the adjoining railroad facilities, it would be manifestly inexpedient to make the street layout until some definite decision was reached relative to the taking of the land for railroad uses.

The matter was therefore deferred for a time, or until midsummer. In the meantime the interested parties, whose business interests are greatly affected by the laying out of the street, addressed the Board through petition, setting forth the extreme urgency of the case and requested that the Board should not wait for a decision from the River Front Commission. The Board acceded to this request and is now awaiting the mutual agreement between the interested parties concerning a private way to be discontinued, in order that it may execute the usual releases submitted by the city in midsummer and necessary to submit with the report of the Board.

In closing this report opportunity is taken to express appreciation of the long and zealous service upon the Board, of its former chairman, Richard Hale Smith, who passed away in the early summer after a service of many years, for the most part as chairman of the Board. Mr. Smith's earnest and faithful

attention to all matters presented and his untiring efforts upon the Board to bring about best results in the best way will be long remembered by all those associated with him.

DEPARTMENT ASSISTANTS.

Mr. Herbert E. Flint, Principal Assistant Engineer has had direct charge of the general office force. Assistants Mr. Edward G. Martin, Mr. Chas. A. L. Wright, Mr. Ernest F. Young, Mr. Chas. J. Hancock, Mr. Harold T. Murphy, and Mr. Edward W. Burnett have performed the general work in office and field. There have also been employed during a portion of the year, Mr. E. T. Riley, Mr. F. L. Hunn, Mr. P. W. Farrar, Mr. J. L. R. Brown, Mr. E. C. Seymour, and Mr. G. E. Wilbur.

Miss Alice M. Hancock has been employed as stenographer and general clerical assistant.

I desire to express my appreciation of the coöperation of the assistants employed and the courtesies extended by the various committees and city officials with whom the department has been associated.

Respectfully submitted,

CHAS M. SLOCUM,

City Engineer.

BOARD OF ALDERMEN, December 28, 1908.

Read, accepted, ordered printed, and sent down for concurrence.

E. A. NEWELL, *Clerk.*

COMMON COUNCIL, December 28, 1908.

Read and concurred.

H. S. GILBERT, *Clerk.*

Presented to the Mayor for approval, December 29, 1908.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, SPRINGFIELD, MASS., December 29, 1908.

Approved.

W. E. SANDERSON, *Mayor.*

WORK ITEMIZED.

BRIDGES.

REPAIRS AND CARE.

	Description of Work.	Cost.
Abbe avenue Overhead Crossing,	Stairways and miscellaneous,	\$444 79
Armory street, over N. Y., N. H. & H. Railroad,	Floor repairs,	13 25
Berkshire street, Red House Crossing,	Floor repairs,	21 98
Ludlow, I. O.,	Floor repairs,	36 77
Main street, I. O.,	Floor repairs,	15 92
North end, over Conn. River,	New stringers and under floor in part; new top floor and sidewalk repairs,	4,559 48
Old Toll,	Renewing aprons on piers and miscellaneous repairs,	944 45
Pasco street, I. O.,	Floor repairs,	32 70
Plainfield street,	Floor repairs,	175 89
South end, over Conn. River, and N. Y., N. H. & H. Railroad,	Floor repairs,	326 36
Sundry bridges,	Miscellaneous repairs,	14 96
		\$6,586 55

STREET CONSTRUCTION.

Fiscal year 1908.

GRADING AND GRAVELING.

Street.	Limits.	Length in feet.	Area in sq. yds.	Total Cost.
Alderman street,	Dickinson street to Sorrento avenue,	1,010	3,828	\$319 93
† Bay road,	Berkshire street to Boston road,	1,800	4,000	1,366 01
Foster street,	Knox street easterly and northerly,	477	1,219	1,052 18
* Main street, I. O.,	Westerly of Parker street,	983		3,230 34
	Total,	4,270	9,047	\$5,968 46

†Graveling only.

*Grading only.

STREET CONSTRUCTION.

MACADAM.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
* Abbe avenue bridge approaches,		872	2,325	80 71	\$1,646 37
Allen street,	Randall avenue southeasterly,	494	1,630	57	930 75
Birnie avenue,	Douglas to Donald street,	607	2,698	62	1,676 46
Euclid avenue,		1,169	3,896	49	1,926 84
Farnsworth street,	Width of 20 feet,	513	1,710	56	965 68
**Fisk avenue,	Talcott to Rowland avenue,	556	1,235	1 15	1,422 96
Franklin street,	Webster to Genesee, width of 20 feet,	1,139	3,797	63	2,411 98
**Genesee street,	Width of 20 feet,	276	821	1 25	1,026 76
Hamburg street,	Width of 20 feet,	574	1,786	60	1,063 20
Kenwood Park,		721	3,888	42	1,680 95
Magnolia terrace,	Sumner avenue to Spruceland avenue,	585	3,120	365	1,140 93
Main street, I. O.,	Westerly of Parker street,	1,160	3,738	64	2,398 87
Mapledell street,		972	3,239	428	1,386 52
Oakland street,	Belmont avenue to Sumner avenue,	731	3,354	72	2,427 75
Parkwood street,		450	1,500	426	639 70
*Pecousic avenue,	Main street to Mill river bridge, width of 20 feet,	350	972	99	963 07
**Plainfield street,	Rowland avenue southerly,	805	1,970	1 01	1,995 89

* Paid for from Special Accounts. ** Includes the cost of cinder or sand foundations.

STREET CONSTRUCTION.

MACADAM—CONTINUED.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
*Roland avenue, Sumner avenue, Springfield street,	Plainfield street to Abbe avenue bridge approach, (Southerly side) Park entrance to Lenox street, Chestnut street northeasterly, done in 1907,	690 1,751 14,415	1,674 3,935 47,288	84 50	\$1,414 52 1,994 94 \$30,623 72

*Includes the cost of cinder or sand foundations.

MACADAMIZING BY PRIVATE PARTIES.

Street.	Limits.	Length in feet.	Area in sq. yds.
Belmont avenue, *Chapin terrace, *Marvin street, *Pratt street,	(Easterly side) Oakland street to Sumner avenue, Chestnut to Marvin street, Pratt street to Chapin terrace, Chestnut to Marvin street,	601 430 600 1,631	1,905 3,112 1,440 2,000 8,457

*Private street.

STREET MAINTENANCE.

Fiscal year 1908.

MACADAM RESURFACING.

Streets.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Chestnut street,	Montmorenci to Springfield street, work done in 1907,				\$977 17
Chestnut street,	Worthington street southerly,	1,553	5,956	\$0 11	656 70
King street,	Walnut street to Eastern avenue (tarvia). exclusive of wood block paving at turnout,	1,906	6,484	46	2,975 44
Locust street,	Main to Mill street (tarvia),	795	3,906	30	1,159 61
North Main street,	Morgan to Sheldon street (tarvia),	1,412	7,024	47	3,308 72
Plainfield street,	Washburn to West street,	832	2,419	13	321 51
State street,	(Southerly side) Oak to Hawley street,	2,311	6,260	23	1,432 20
Worthington street,	Water street easterly,	304	1,015	40	446 30
		9,173	33,064		\$11,277 65

SIDEWALKS AND CURBING.

Fiscal year 1908.

CONSTRUCTION AND RECONSTRUCTION.

By orders of the City Council.

Street.	Length in feet.	SIDEWALKS.		CURBING. Length in feet. 4"	Order approved.
		Material.	Description.		
Abbe ave.,	850	Tar concrete,	New,	1,693	July 2, 1906.
Beacon street,				505	June 30, 1908.
Catharine street,	100	Brick,	Relaid,		Nov. 26, 1907.
Catharine street,	428	Tar concrete,	Skim coated,		Nov. 26, 1907.
Clantoy street,	1,155	Tar concrete,	New,	2,436	June 23, 1908.
College ave.,	406	Tar concrete,	Skim coated,		Jan. 14, 1908.
* Crystal ave.,				105	Sept. 15, 1908.
Dresden street,	801	Tar concrete,	Skim coated,		Aug. 20, 1907.
Dresden street,	280	Tar concrete,	New,		July 7, 1908.
Everett street,	50	Brick,	Relaid,		Nov. 26, 1907.
* Fisk avenue,	70	Brick,	New,	604	Oct. 13, 1908.
Foster street,	280	Brick,	New,	1,856	Apr. 7, 1908.
Keith street,					Oct. 22, 1907.
Mouth street,	2,133	Tar concrete,	Skim coated,		May 28, 1907.
Palmer ave.,	180	Brick,	Relaid,		June 30, 1908.
Palmer ave.,	170	Tar concrete,	Skim coated,		June 30, 1908.
Reed street,	1,104	Tar concrete,	New,	1,227	Aug. 20, 1907.

* Incomplete.

SIDEWALKS AND CURBING. CONTINUED.

Street.	SIDEWALKS.		CURBING Length in feet.	Order approved.
	Length in feet.	Material. Description.		
Reed street,	133	Brick, Relaid,		Aug. 20, 1907.
Shattuck street,	893	Brick, New,	1,455	Oct. 22, 1907.
Springfield street,	605	Tar concrete, New,	600	July 2, 1907.
White street,	430	Tar concrete, New,		Dec. 24, 1907.
William street,	396	Brick, Relaid,		Jan. 14, 1908.
Yale street,	1,829	Tar concrete, Skim coated,	10,400	July 28, 1907.

SIDEWALKS AND CURBING.

CONSTRUCTION BY ORDERS OF ABUTTERS.

Street.	Length in feet.	SIDEWALKS.		CURBING.	
		Material:	Description.	Length in feet. 4"	10"
Bay street,				53	
Belmont avenue,	44	Tar concrete,	Skim coated,		
Bloomfield street,				305	
Bowdoin street,	300	Brick,	Relaid,		
Eastern avenue,	55	Brick,	New,	55	
*High street,				170	
Kensington avenue,				360	
*Main street,					50
*Main street, I. O.,				267	
Oakland street,	477	Brick,	Relaid,	747	
State street,	80	Brick,	Relaid,		
St. James avenue,	50	Brick,	Relaid,		
*Welcome place,				217	
Wilcox street,				54	
				2,228	50

*Curbing furnished by owner of abutting property.

STREET CONSTRUCTION.

PAVING.

Street.	Limits.	Material.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
*King street,	Street Railway turnout,	Wood blocks,	317	1,023		\$859 31
Lyman street,	Chestnut street easterly,	Granite blocks,	503	2,095	\$1 13	2,307 03
State street,	Main to Dwight street,	Wood blocks,	478	2,403	3 27	7,850 16
Townley avenue,		Bitulithic,	142	214	2 50	536 00
*Worthington street,	Street Railway turnout at Sackett place,	Wood blocks,	265	886		746 10
*Worthington street,	Street Railway turnout, be- tween Federal and Armory streets,	Wood blocks,	374	1,312		1,106 88
			2,079	7,933		\$13,404 98

*Cost the City 90 cents a square yard. Balance of cost borne by the Springfield Street Railway Company according to agreement.

PAVING DONE BY THE SPRINGFIELD STREET RAILWAY COMPANY.

Street.	Limits.	Material.	Area in sq. yards.
North Main street,	Branch-off at Wason avenue,	Vitrified brick,	196
State street,	Branch-off at Walnut street,	Vitrified brick,	278
			474

STREET MAINTENANCE.

PAVING RESURFACING.

Streets.	Materials.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Bridge street,	Bitulithic,	1,279	\$0 75	\$959 25
Hampden street,	Bitulithic,	840	75	630 00
State street,	Bitulithic,	1,369	75	1,026 75
Walnut street,	Bitulithic,	680	75	510 00
Worthington street,	Bitulithic,	757	75	567 75
		4,925		\$3,693 75

MACADAM REPLACED BY PAVING.

STREET.	Limits.	Length in feet.	Area in sq. yds.
King street,	at R. R. turnout,	317	1,023
Lyman street,	Chestnut easterly,	503	2,095
No. Main street,	turnout at Wason ave.,	—	196
State street,	turnout at Walnut,	—	278
Townsley ave.,		138	214
Worthington st.,	turnout at Sackett place,	265	886
Worthington st.,	turnout between Federal and Ar- mory streets,	374	1,312
		1,597	6,004

PAVING REPLACED BY OTHER PAVING.

GRANITE BLOCKS BY WOOD BLOCKS.

STREET.	Limits.	Length in feet.	Area in sq. yds.
State street,	Main to Dwight,	478	2,403

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year laid.
Belmont avenue,	Hall street westerly,	Catskill blocks,	1,362	1,211	1901
Belmont avenue,	Hall to Oakland,	Metropolitan blocks,	1,023	914	1903
Birnie avenue,	Hooker street northerly,	Johnsonburg blocks,	145	488	1906
Bridge street,	Main to Dwight,	Rock asphalt,	688	2,625	1900
Bridge street,	Main street, 493 feet westerly,	Bitulithic,	493	1,746	1905
Bridge street,	Water street to Old Toll bridge,	Granite blocks,	249	713	1907
Catharine street,	State to Bay,	Syracuse brick,	1,722	5,691	1900
Charles street,	Liberty to land of B. & A. R. R.,	Granite blocks,	150	376	1903
Chestnut street,	Worthington to Lyman,	Granite blocks,	472	1,673	1895
Chestnut street,	Lyman to B. & A. R. R.,	Granite blocks,	256	1,471	1899
Chestnut street,	B. & A. R. R. to Linden st.,	Granite blocks,	1,640	5,235	1892
Chestnut street,	Linden to Carew,	Granite blocks,	773	2,156	1893
Chestnut street,	Carew to Allendale,	Syracuse brick,	1,015	3,432	1900
Chestnut street,	Allendale to Jefferson ave.,	Bitulithic,	825	2,898	1905
Court street,	Main to Court Square ave.,	{ Rock asphalt, Syracuse brick,	317	1,149	1897
		{ Syracuse brick,	—	174	1897
		{ Syracuse brick,	—	128	1907
Court square avenue,	Court to Elm st.,	{ Rock asphalt, Syracuse brick,	193	503	1897
Cypress street,	Main street westerly,	{ Syracuse brick, Granite blocks,	—	330	1897
			459	1,700	1904

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Cypress street,	Boylston to Fulton,	Granite blocks,	216	848	1905
Dwight street,	State to Lyman,	Syracuse brick,	2,324	9,905	1896
East Court street,	Main to Market,	Rock asphalt,	117	297	1900
Elm street,	Main to Court Square ave.,	{ Rock asphalt,	343	919	1897
		{ Syracuse brick,	—	330	1897
Fort street,	Main to Water,	Granite blocks,	670	1,770	1895
Fulton street,	Cypress to Vine,	Granite blocks,	1,125	3,006	1906
Hampden street,	Main street westerly,	Bitulithic,	212	821	1904
Hampden street,	completion, Main to Water,	Bitulithic,	394	1,539	1905
Harrison avenue,	Main to Dwight,	Trinidad asphalt,	586	2,247	1896
Hillman street,	Main to Dwight,	Bitulithic,	648	2,025	1906
King street,	St. Ry. turnout,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	317	1,023	1908
Liberty street,	Chestnut to Cass,	Syracuse brick,	1,399	4,571	1900
Liberty street,	Cass to Heywood ave.,	Syracuse brick,	1,147	3,971	1901
Lyman street,	Main to Chestnut,	Granite blocks,	1,305	4,599	1889
Lyman street,	Chestnut street, easterly,	Granite blocks,	503	2,095	1908
Main street,	Locust to Marble,	Syracuse brick,	840	4,381	1897
Main street,	Marble to William,	Syracuse brick,	1,762	8,307	1896
Main street,	William to Bliss,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	1,150	6,460	1906

TABLE OF PAVED STREETS

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Main street,	Bliss to State,	Syracuse brick,	241	1,355	1898
Main street,	State to Worthington,	Creo-resinate wood bl'ks, 3" x 3½" x 8",	1,899	10,798	1904
Main street,	Worthington to Hampden, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 8"	382	1,188	1904
Main street,	Worthington to Hampden, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8",	—	962	1903
Main street,	Hampden to Lyman,	Creo-resinate wood bl'ks, 4" x 4" x 8",	153	775	1903
Main street,	Lyman to Liberty,	Creo-resinate grooved, wood bl'ks, 4"x4"x8",	484	2,780	1903
Main street,	Liberty to Sharon, east side,	Creo resinate wood bl'ks, 4" x 4" x 8",	453	1,135	1903
Main street,	Liberty to Sharon, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	—	1,487	1907
Main street,	Sharon to near Franklin and Emery,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	509	3,103	1907
Main street,	near Franklin, east side,	Syracuse brick,	36	144	1907
Main street,	Franklin to Carew, east side,	Syracuse brick,	1,302	4,805	1897
Main street,	Emery to Sargeant, west side,	Catskill blocks,	1,447	5,449	1901

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Main street,	crossing opposite Auburn street,	Catskill and Metropolitan blocks,	—	163	1903
Maple street,	Central to High,	Bitulithic,	1,563	5,665	1904
Maple street,	High to State,	Bitulithic,	593	2,530	1905
Market street,	State to Harrison ave.,	Bitulithic,	968	1,887	1906
North Main street,	Plainfield to Morgan,	Bitulithic,	730	4,485	1906
North Main street,	at Wason ave.,	Syracuse brick,	—	196	1908
Plainfield street,	Sargeant to Fulton,	Syracuse brick,	1,710	10,249	1902
Railroad street,	Main to Water,	Granite blocks,	516	1,539	1906
Sanford street,	Main to Market,	Rock asphalt,	102	207	1900
State street,	Main to Dwight,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	478	2,403	1908
State street,	Dwight to City Library,	Granite blocks,	541	1,631	1890
State street,	Dwight to Chestnut (widened),	Granite blocks,	—	217	1896
State street,	Federal to Oak,	Syracuse brick,	847	4,590	1897
State street,	at Walnut,	Syracuse brick,	—	278	1908
State street,	at St. James avenue,	Syracuse brick,	—	183	1907
State street,	Sherman to Highland Div.,				
	N. Y., N. H. & H. R. R.,	Bitulithic,	820	4,352	1905
Summer street,	Spring to near Autumn,	Granite blocks,	567	1,612	1907
Summer street,	Autumn to Kibbe ave.,	Granite blocks,	1,259	4,029	1895

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Summer street,	Kibbe avenue to point 85' west, of Federal,	Granite blocks,	787	2,695	1901
Taylor street,	Main to Dwight,	Bitulithic,	770	2,580	1904
Townslcy avenue,		Bitulithic,	142	214	1908
Walnut street,	State to Union,	Syracuse brick,	638	2,144	1899
Walnut street,	Union to Pendleton ave.,	Syracuse brick,	873	3,140	1900
Walnut street,	Pendleton ave. to Lebanon st.,	Bitulithic,	1,195	3,888	1905
Walnut street,	Lebanon to Hancock,	Bitulithic,	1,005	3,334	1906
White street,	Allen to Orange,	Syracuse brick,	1,610	2,400	1902
Worthington street,	Main to Dwight,	Syracuse brick,	739	2,544	1896
Worthington street,	Dwight to Fairbanks place,	Syracuse brick,	1,060	3,869	1901
Worthington street,	Fairbanks place to east line of Spring,	Syracuse brick,	269	1,003	1903
Worthington street,	Main to Cook's ave.,	Bitulithic,	404	1,418	1905
Worthington street,	at Sackett place,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	265	886	1908
Worthington street,	Federal to Armory,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	374	1,312	1908
Total.			54,571	204,911	

RECAPITULATION.

Material.	Length in feet.	Length in miles.	Area in sq. yds.	Material.	Length in feet.	Length in miles.	Area in sq. yds.
Bitulithic.	10,762	2.038	39,382	Metropolitan blocks,	1,023	.194	990
Catskill blocks,	2,809	.532	6,741	Rock asphalt,	1,760	.333	5,680
Creo-resinate wood blocks,	6,464	1.224	34,807	Syracuse brick,	19,534	3.7	77,920
Granite blocks,	11,488	2.176	37,205	Trinidad asphalt,	586	.111	2,247
Johnsonburg blocks,	145	.027	483				
Total,					54,571	10.335	201,911

STREETS MADE PUBLIC.

Name.	Limits.	Length in feet.	Width in feet.
Abbe ave bridge and approaches,	Fisk avenue to Birnie avenue.	1,008	34
Brace street,	Belmont avenue to Dickinson street,	367	45
Chester street,	Central street southerly,	296	35.5
Chicopee road,	Carew street to St. James avenue,	4,320	50
Cliftwood street,	Sumner avenue southerly,	450	40 to 36.5
Clinton street ap- proaches,	Conn. River R. R. to Fulton street,	610	30
Continental street,	Sumner avenue southerly,	450	50
Foster street,	Central street southerly to Knox street,	723	33
Harriet street,	North Main to Chestnut street,	817	50
Hayden avenue,	State street northerly,	878	30
Melrose street,	Walnut street easterly and southerly,	490	33 to 30
Pecousic avenue,	Gardner to York street,	862	100
Ripley place,	St. James avenue southerly,	211	24.5
Rowland street,	Plainfield street to Conn. R. R.,	886	50
		12,368	

STREETS RELOCATED AND WIDENED.

Name.	Limits.	Length in feet.	Width in feet.
Dickinson street,	Belmont avenue to Long- meadow line,	2,677	60
Main street, I. O.,	Rogers avenue to near Parker street,	1,154	66
		3,831	

CONCRETE SEWERS—1908.

STREET.	LIMITS.	Size and Shape.	Length in feet.	Total Cost.	Cost per Lin. Foot.	Average Depth of Cutting in Feet.	Materials Excavated.
†Cypress st....	Conn. river to Fulton st.....	4' 10" x 7' 3" elliptical	385	\$3,890.53	\$10.11	14.6	Sand
Cypress st.....	Fulton to Main st.....	4' 2" x 6' 3" elliptical	691	6,144.30	8.89	18.0	Sand
Ferry st.....	Main st. to Garden brook sewer..	4' 2" x 6' 3" elliptical	394	11,067.29	7.92	13.8	Sand, quicksand, clay, muck
Ferry st.....	Garden brook sewer, easterly.....	4' 9" circular	1,004			9.4	Sand, quicksand, clay, muck
●Pecousic ave., At Mill river.....		2' 8" x 4' 0" egg shape	25	93.33	3.73	.....
†State st.....	High School to School st.....	2' 0" x 3' 0" egg shape	726	6,437.39	2.60	8.8	Sand
†State st.....	School to Myrtle st.....	2' 2" circular	306			7.6	Sand, clay
†State st.....	Myrtle to Walnut st.....	2' 0" circular	1,440			8.3	Sand
†Union st.....	Main to near Dale st.....	3' 2" x 4' 9" elliptical	718	13,447.59	5.00	12.3	Sand, quicksand, clay, muck
†Union st.....	Near Dale to near School st.....	2' 8" circular	951			9.8	Sand, clay, muck
†Union st.	Near School st. to Ingraham ave.	2' 3" circular	1,021			9.6	Sand
Total.....			7,661	\$41,080.43			

†Relaid.

*Completed.

STREET.

LIMITS.

STREET.	LIMITS.	Size in Inches.							Total Length in Feet.	Number of Manholes.	Total Cost of Sewer. in ft.	Cost per foot of Sewer. in ft.	Average depth in ft.	Width of Trench. in ft.	Materials Excavated.
		24"	20"	18"	15"	12"	10"	8"							
Alderman st.	Extension easterly to Pomona st.								306	1	\$232.21	\$0.76	8.4	3.6	Sand
Austin st.	State st., northerly								363	1	334.91	.92	9.0	3.3	Sand
Bryant st.	Belmont ave., northerly								750	1	576.46	.77	8.3	3.6	Sand
Carlele st.	Wichita road, northerly	274	301	175				216	646	3	355.69	.55	4.3	3.3	Sand, hardpan
Centre st., I. O.	Cedar st., easterly								400	2	311.81	.85	7.3	3.6	Gravel
Chatter st.	Mill st., northerly								620	4	509.11	.82	8.5	3.6	Sand
Clancy st.	Extension southerly								161	2	431.41	.86	7.4	3.7	Sand
Commonwealth ave.	Washington ave. to Fairview st.	545							241	2	530.68	.97	10.5	3.7	Sand
Crystal ave.	Dickinson st., westerly	362	372						534	3	650.64	.49	7.3	3.6	Sand
Dionid st.	Birnie ave., easterly								734	3	388.50	1.23	7.7	3.6	Clayey loam, water
Doris st.	Smith st., northerly								315	0	182.12	.83	7.0	3.6	Sand
Edinwood st.	Extension westerly to Hanover st.								219	1	303.42	1.22	8.4	3.3	Sandy marl
Holly st., I. O.	Hampton st., southerly								175	2	117.69	.67	7.3	3.7	Gravel
Hollywood st.	Commonwealth ave., easterly								452	3	446.87	.99	8.0	3.6	Sand
Hunter place	State st., northerly								211	241	602.72	.91	9.5	3.5	Sand
Kensington ave.	Extension easterly to Earl st.								350	313	695.85	1.29	11.6	3.5	Sand
Kibbe Hollow	Worthington st., northerly								533	533	1,144.10	2.93	7.5	3.8	Loam, hardpan, rock
Knox st.	Mill river to Smith st.								447	1	290.03	.65	6.6	3.5	Sand
Longfellow terrace	White st., westerly								437	1	1,309.93	1.73	9.8	3.5	Clay and sand
Longhill st.	Main st. to Warner place.								446	2	902.60	.98	9.5	3.6	Sand
Lyndale st.	Belmont ave., northerly	116	400	210					756	3	218.09	1.46	8.0	3.5	Marl and quicksand
Marvin st.	Pratt st., southerly								149	1	433.02	.91	8.5	3.6	Sand
Mason place.	Dickinson st., southerly								201	1	231.42	1.15	8.0	3.2	Sand
Meirhoe st., I. O.	Carew st. to Van Horn ave.								201	1	1,467.66	1.04	8.5	3.7	Sand
Mooreland ave.	Extension westerly to Walnut st.								212	1,413	93.61	1.40	7.0	3.3	Sand
Nelson ave.	Extension northerly to King st.								67	1	155.85	.68	4.1	3.5	Sand
Norfolk st.	Extension southerly								229	1	869.53	1.34	8.0	3.3	Marl
Oranney st.	Westnut to Marvin st.								350	299	131.76	.76	7.5	3.5	Sand
Riverview st.	Wilmore st., northerly								200	1	354.50	1.14	8.3	3.5	Sand and clayey loam
Searle place.	Riverview terrace to Chase ave.								310	1	231.61	1.30	8.5	3.5	Sand
Smith st.	Walnut st., easterly								178	2	48.55	1.43	6.5	3.5	Sand
Sorrento ave.	Borne st., easterly								34	1	271.15	.83	7.0	3.5	Sand
State st.	Sumner ave., northerly								375	1	2,241.65	1.23	10.0	3.3	Sand
State st.	At Walnut st., connecting new with old								1,852	8	342.98	2.32	11.0	3.5	Clay
Stearns square	Extension to Alden Warner's								148	1	565.35	.52	5.3	3.3	Sand
Suffolk st.	Worthington st., s'ly (east roadway).								1,096	4	440.44	.93	8.6	3.5	Sand
Summer terrace	Extension southerly								472	3	199.50	.58	7.8	3.5	Sand
Ventura st.	Sumner ave., northerly								341	1	1,719.01	1.67	10.7	3.5	Sand
Waba st.	Grenada terrace, northerly								50	0	132.30	2.24	8.5	3.7	Clayey loam
Winthrop st.	Sumner ave., southerly								1,028	5					
	Extension easterly from Main st.	59													
									246	19,815	\$20,006.75				

** Incomplete. † Storm water only. 1.40' of 4" underdrain. 4.81' of 4" underdrain.

* Completed. ‡ Refold. 3.12' " 4" 3.16' " 4" 3.16' " 4"

***COST OF SEWER SYSTEM TO NOV. 30, 1908.**

YEARS.	CONSTRUCTION.	MAINTENANCE.	TOTAL.
1863-1880 incliysi	\$357,163 72	\$38,178 38	\$395,342 10
1881	43,902 05	2,359 29	46,261 34
1882	28,391 33	3,039 25	31,430 58
1883	26,573 85	4,039 33	30,613 18
1884	36,035 22	2,929 25	38,964 47
1885	29,199 74	2,477 23	31,676 97
1886	25,313 73	2,541 81	27,855 54
1887	33,967 31	2 376 47	36,343 78
1888	30,872 07	3,951 21	34,823 28
1889	24,123 28	6,056 46	30,179 74
1890	20,722 72	10,004 42	30,727 14
1891	25,568 51	6,412 75	31,981 26
1892	27,381 84	6,823 51	34,205 35
1893	25,743 24	8,553 66	34,296 90
1894	27,142 69	7,236 53	34,379 22
1895	23,905 82	7,598 31	31,504 13
1896	45,299 89	8,634 30	53,934 19
1897	33,976 14	8,790 00	42,766 14
1898	47,751 26	6,986 99	54,738 25
1899	51,246 07	8,594 56	59,840 63
1900	140,380 89	9,862 21	150,243 10
1901	80,276 02	13,272 25	93,548 27
1902	38,904 19	12,909 40	51,813 59
1903	29,169 75	9,034 88	38,204 63
1904	46,339 05	12,916 69	59,255 74
1905	40,831 47	9,620 62	50,452 09
1906	24,419 73	12,444 00	36,863 73
1907	47,977 73	10,797 97	58,775 70
1908	62,949 97	10,468 88	73,418 85
	\$1,475,529 28	\$248,910 61	\$1,724,439 89

*Does not include cost of connections to buildings nor street inlets.

•PRECIPITATION FOR CALENDAR YEAR, 1908.

Month.	Total in Inches.	Greatest Amt. in 24 hrs.	Dates.	Portion of storms in which the Precip- itation exceeded $\frac{1}{2}$ inch per hour.	Max. Rate per Hour— Inches.	Duration of Max. Rate— Minutes.
Jan.	3.25	1.03	7 & 8	Feb. 1, .68 inches in 60 min.	1.00	20
Feb.	4.14	1.20	1	" 15, .19 " " 13	.87	13
March	2.58	1.01	18 & 19	May 22, .50 " " 50 "	1.00	20
April	1.61	.55	8 & 9	June 23, .17 " " 20 "	.51	20
May	5.15	1.55	30	" 24, 1.46 " " 73 "	2.70	10
June	2.50	1.74	24	July 2, 1.10 " " 45 "	4.00	10
July	3.80	1.34	25	" 3, .15 " " 10 "	.90	10
Aug.	6.99	2.88	5 & 6	" 14, .57 " " 32 "	2.00	10
Sept.	.83	.83	28 & 29	" 25, .34 " " 38 "	.54	38
Oct.	2.62	1.00	25 & 26	Aug. 5, 1.62 " " 73 "	4.00	10
Nov.	.72	.55	14 & 15	" 6, 1.27 " " 51 "	2.76	19
Dec.	1.89	1.49	7	" 11, .73 " " 37 "	2.34	17
Total	36.08					

*Includes rain, melted hail, sleet and snow.

Number of days in which the precipitation exceeded .01 of an inch, 91 days
 Number of days during which snow fell, 27 days
 Date of last snowfall in spring, April 20
 Date of first snowfall in fall, Nov. 5
 Highest river and date, Feb. 17, 13.2'
 Lowest river and date, July 2 & 3, 2.5'
 Annual range of river, 10 7'
 Mean daily height of river, 5.34'
 Greatest 24-hour rise and date, Feb. 15, 7.5'
 Greatest 24-hour fall and date, Feb. 18, 2.5'

GENERAL STATISTICS.

CITY OF SPRINGFIELD, MASS., NOVEMBER 30, 1908.

Springfield is situated on the east bank of the Connecticut river, in latitude 42° 06' north, longitude 72° 35' west, at an elevation above sea level of from 65 to over 215 feet.

Zero of "City Base" is 27.1 feet below sea level.

State street, at corner of Main street, is 65.9 feet above sea level, or 93 feet "City Base."

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner avenue, at corner of Belmont avenue, is 187.9 feet above sea level.

Population, estimated May 1, 1908,	82,347
Number of voters: men, 14,885; women, 323; total,	15,208
Number of polls, May 1, 1908,	23,632
School enrollment: public, 14,451; parochial, 2,040; total,	16,491
Greatest extent of city, north and south,	5.9 miles
Greatest extent of city, east and west,	8.9 miles
Connecticut river frontage,	4.65 miles
Area, including those portions covered by water, approximately,	24,661 acres

Area by wards: Ward One, 1,733.6 acres; Two, 225.7 acres; Three, 234.8 acres; Four, 413.2 acres; Five, 400.6 acres; Six, 327.4 acres; Seven, 2,197.7 acres; Eight, 19,128.3 acres.

Total park areas, 519.82 acres; Forest Park, 476.10 acres.

Area taxed, 16,185 acres; tax rate, \$15.50 per \$1,000.

Valuation,	Real estate,	.	\$76,965,520	}	\$97,098.308
	Personal,	.	20,132.788		
				Square yards.	Miles.
Public streets accepted to Nov. 30, 1908,	} 153.79 miles.	}	Wood block,	34,370	1.22
			Granite block.	37,205	2.18
			*Syracuse brick,	77,920	3.70
			Sheet asphalt,	7,877	.44
			Other brick pavers,	8,220	.75
			Bitulithic,	39,362	2.04
			Macadam,	.	63.51
			Gravel or dirt,	.	79.95
Sidewalks laid in public streets to Nov. 30, 1908,				.	162.50

*Does not include brick pavement in railway tracks around Court Square.

Electric railways (double track counted twice),					
in public streets,	.	.	.	50.013 miles	
on private property,	.	.	.	2.448 miles	
				<hr/>	
				52.461 miles	
Steam railroads,	.	.	{	Four tracks, about	. 4.5 miles
	.	.		Double tracks, about	. 7. miles
	.	.		Single track, about	. 11. miles
Water mains,	161.85 miles
Gas mains,	126.59 miles
Sewers, 114.801 miles,	.	.	{	Brick sewers,	. 26.352 miles
	.	.		Vitrified clay pipe,	. 60.535 miles
	.	.		Cement pipe,	. 24.852 miles
	.	.		Brick, stone and plank,	. .430 miles
	.	.		Wood pipe,	. .193 miles
	.	.		Cast iron,	. .028 miles
	.	.		Concrete,	. 2.286 miles
			Brick-concrete,	. .125 miles	
Street lights, arc,	1,063		Chemical engines,	. 2	
Street lights, incandescent,	73		Hose wagons,	. 10	
Dwelling houses,	13,024		Motor driven hose wagons,	. 1	
Schoolhouses,	35		Spare hose,	. 1	
Churches,	58		Ladder trucks,	. 4	
Post offices,	4		Aerial trucks,	. 2	
Police stations,	2		Water towers,	. 1	
Railroad stations,	7		Motor auxiliaries,	. 2	
Engine houses,	12		Automobiles, Chief and Dep. Chief,	2	
Steam fire engines,	8		Trolley transportation car,	1	
Spare engines,	1				

CITY EXPENDITURES.

City Engineering department,	.	.	.	.	.	\$12,069.28
Fire department,	.	.	.	.	.	179,691.05
Forestry,	.	.	.	.	.	14,321.93
Street department,	{	Maintenance,	.	\$133,710.02	}	249,461.91
		Paving,	.	13,464.98		
		Macadam and gravel,		33,982.74		
		Walks and curbing,		25,068.46		
		Special accounts,		43,235.71		
Sewer department,	.	.	.	.	.	79,047.61
Police department,	.	.	.	.	.	126,245.60

Public parks,	\$48,694.16
Lighting streets,	86,243.84
Water department, cash expenses,	270,912.48
School department,	513,524.30
Pauper department,	51,587.39
Scavenger department,	20,973.06
Collection of ashes,	33,024.93
Watering streets,	33,780.47

Report of

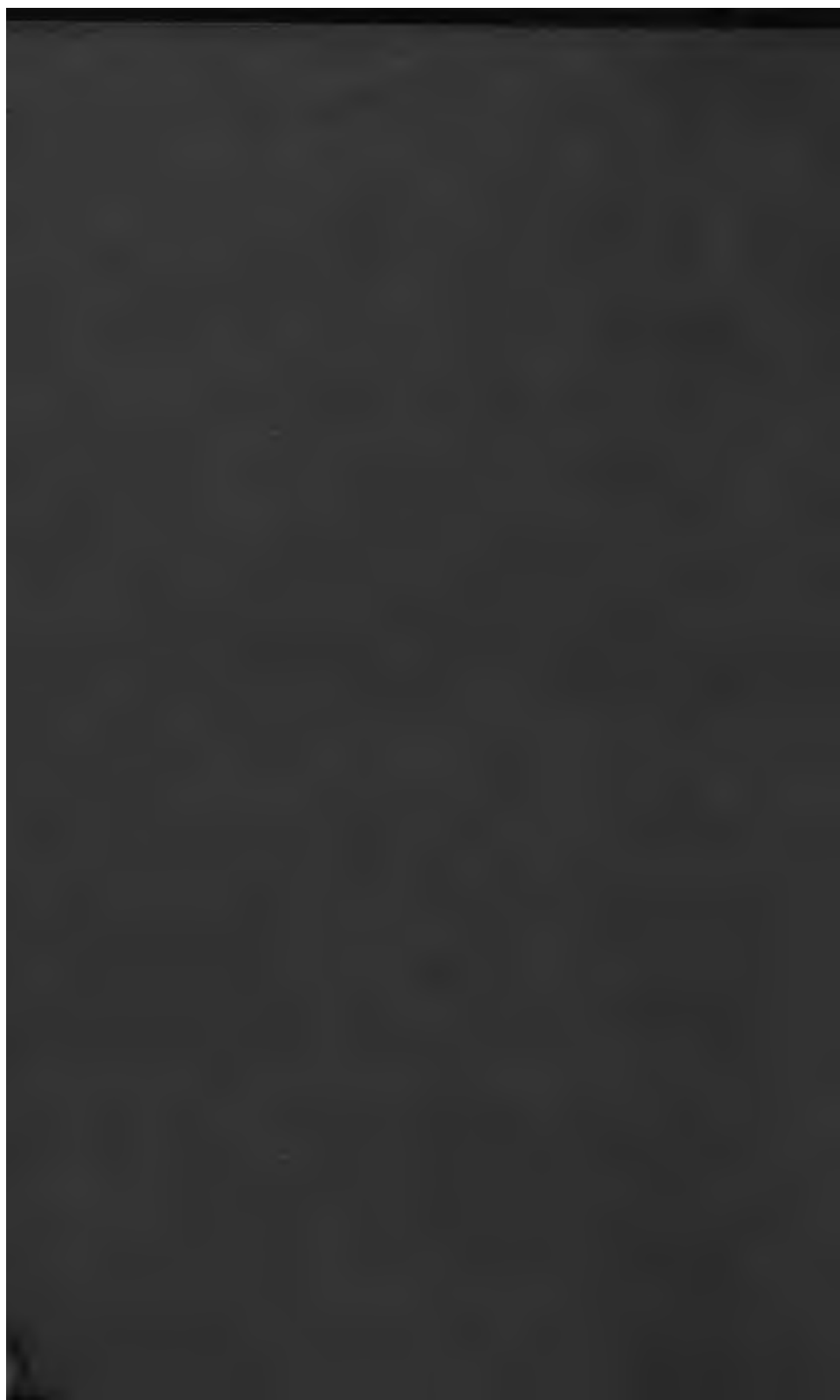
City Engineer

Springfield

Mass.



For the Year 1909



Report of

City Engineer

Compliments of

CHARLES M. SLOCUM

★ *City Engineer*

1909

REPORT OF CITY ENGINEER

CITY OF SPRINGFIELD, MASS., December 27, 1909.

To the City Council :—

In accordance with the provisions of the City Ordinances, the annual report of the Engineering Department for the year 1909 is respectfully submitted, with a statement of receipts and expenditures and a general description of the more important work, also such suggestions as have been considered in order.

FINANCIAL STATEMENT

RECEIPTS

Annual appropriation for year 1909..	\$9,500 00	
Transferred from Lighting Streets account	300 00	
Receipts from other city departments	2,876 47	
		<hr/> \$12,676 47

EXPENDITURES

Salaries of City Engineer and Assist- ants	\$10,488 63	
Office rent and lighting.....	570 19	
Drawing materials, stationery and general supplies	341 09	
Car fares, automobile service and sundry office expenses	832 36	
		<hr/> 12,232 27
Balance unexpended		<hr/> \$444 20

DESCRIPTION OF EXPENDITURES

ENGINEERING DEPARTMENT

For all services performed on account of matters referred to the Board of Public Works by the City Council relating to the laying out or alteration of streets, sidewalks, sewers and parks; for surveys and levels, plans and profiles, estimates of cost, releases from damages, reports to the City Council, and general correspondence and interviews relating to matters referred to the Board, and all clerical work performed relating to public hearings and all meetings of the Board; measuring and assigning house numbers, work upon house number books and records, and making new plans; furnishing street lines and grades to individuals for buildings, grading, fencing, and sidewalk construction; surveys, estimates, and all general services performed for the various committees of the City Council; general map, plan, and profile drawing of streets, sewers, and public property for office records and for future reference; measuring and recording all sewer connections for house drains, and furnishing lines and grades; preparation of plans for the City Solicitor's use; survey and plan for purchase of proposed lot for Police Building; expert service, inspection of North and South End bridges to determine safety; surveys, plans and estimates, lines and grades for extension of Pecousic avenue; indexing plans and other office records; photographing and blueprinting, examination of deed records, setting of street monuments, and all other services not charged to other city departments, the sum of \$7,541.05

HIGHWAY DEPARTMENT

For all services performed on account of and charged to the street work appropriation; estimates and plans, lines and grades for paving, macadam, and gravel, final measurements, inspection of paving and bridge repairs and maintenance, cleaning and painting North and South End bridges, and all other incidental work, the sum of \$561.19

SIDEWALK AND CURBING DEPARTMENT

For all services performed for the general sidewalk and curbing appropriation; lines and grades for laying out and construction, measurements for assessments, and all work incidental thereto, the sum of \$332.39

SEWER DEPARTMENT

For all services performed on account of the general sewer appropriation; plans, estimates, laying out of work and general supervision of construction details, and all other incidental work, the sum of \$552.84

WATER DEPARTMENT

For all services performed for the Water Department; running street lines for laying new mains, and all incidental work, the sum of \$10.00

ASSESSORS' DEPARTMENT

Surveys and plans, computations of areas and dimensions for plans of private property and examination of deed records, the sum of \$575.94

PARK DEPARTMENT

For all services performed for the Park Department, the sum of \$19.05

WATERING STREETS ACCOUNT

Determination of lengths and widths of roadways watered for assessments, the sum of \$2.25

KENSINGTON SCHOOL

Plan of schoolhouse lot, the sum of \$4.50

LINCOLN SCHOOL

Lines and grades for walks, the sum of \$14.28

FORESTRY DEPARTMENT

Location of street line, Boston Road, the sum of \$1.25

*City Engineer's Report***LIGHTING STREETS**

Photographs in storeyard, the sum of **\$4.50**

INDEPENDENCE DAY FUND

Staking out racing course for Fourth of July athletic sports, including part of 1908 work, the sum of **\$20.88**

POLICE DEPARTMENT

Surveys and plans of site for new building, corner of Court and Water streets, the sum of **\$1.50**

LAW DEPARTMENT

Measurements and photographs for evidence in prosecuting claims on account of defective sidewalks; also for smoke nuisance, the sum of **\$13.41**

FIRE DEPARTMENT

Survey of lot and setting boundary marks at the Oakland Street engine house; surveys and plans of site for new engine house, Dwight street; also site for new engine house, Margaret street, the sum of **\$14.88**

**PECOUSIC AVENUE OPENING AND IMPROVEMENTS,
YORK TO GARDNER STREETS**

Lines and grades for moving buildings and opening street to public travel; also grading and macadamizing York street to Main street, the sum of **\$81.30**

PAUPER DEPARTMENT

Locating buildings at Almshouse, the sum of **\$9.50**

NORTH STREET EXTENSION

Surveys, plans and computations for extending North street, from Liberty street to Carew street, the sum of **\$247.30**

MILITIA RIFLE RANGE ACCOUNT

Surveys and plans for Rifle Range Club House, Shooting Range; specifications and supervision, architect's services, and all incidental work, the sum of **\$371.65**

MUNICIPAL BUILDING GROUP

Surveys and plan of lot, the sum of \$7.31

RIVER FRONT IMPROVEMENT (PROPOSED)

Surveys and plans for the extension of Dwight street and Water street under the B. & A. R. R., and photographs made in 1908, and all incidental work, the sum of \$101.66

DESCRIPTION OF WORK**PAVING**

The work of paving has been rather limited, owing to the appropriation for street work in general, which was insufficient to permit much permanent paving. The work has proceeded along the usual lines, the work having been done by days' labor, rather than by contract, under the general supervision of the Street and Engineering Departments.

WOOD BLOCK

A large part of the new paving consisted of creosoted gum wood blocks, laid on a concrete foundation, as this wood material continues to meet the approval of the public, possessing smoothness and comparative freedom from noise. The wood blocks furnished by the United States Wood Preserving Company were tested for penetration and found to contain the proper quantity of creosote oil to protect the timber from decay. An inspection of the timber and treatment was also made at the works in Norfolk, Va. Although expensive in first cost, the wood block pavement continues to meet popular favor.

The concrete base was laid four and one-half inches in depth, as has been the practice for all paving work on concrete during the last few years, the custom having been formerly to use a depth of six inches; the shallower base fully meets all necessities and conditions of traffic, when well laid with good materials and Portland cement used to

bind the aggregates together; 12,431 square yards have been laid, at an average cost for all labor and materials of \$3.29 per square yard.

The cost of the treated gum wood blocks was \$2.10 per square yard, on the cars at Springfield.

The new work laid in streets having double tracks for street railway, was provided with a bed of concrete under the ties for the entire track space, and where the tracks were relaid, new nine-inch full-grooved girder rails were used, with standard distance of 9' 6½" between centers.

BITULITHIC PAVING

Only a small addition to the bitulithic pavement was made during the year, Barnes street, from Bridge to Hillman street, having been paved with this material. As the subsoil in the street was subject to disturbance by frost, a concrete base of the usual depth was first laid. This work was performed under contract with the Messrs. Warren Brothers. 552½ square yards were laid, at a total cost of \$1381.25, or at the rate of \$2.50 per square yard.

BITULITHIC RESURFACING AND REPAIRS

The condition of the bitulithic pavement heretofore laid was such that a large amount of surface repairs were required, and the Messrs. Warren Brothers were called upon to perform the work, for which the sum of 85 cents per square yard was paid. A total of 7062 square yards were repaired.

GRANITE BLOCK

The granite blocks taken from Chestnut street, where the new wood block pavement was laid, were removed to Lyman street, east from Chestnut street, where they were laid on a sand bed. No new granite blocks have been purchased for many years, the noise and roughness resulting from this material being in disfavor with the public.

A tabulation of the new paving work will be found at the end of this report.

SEWER CONSTRUCTION

The work on the sewer system has advanced after the order of recent years, all work having been done by days' labor, and Portland cement concrete used for all sewers more than twenty-four inches in diameter, the relative economy resulting from the use of concrete and collapsible steel forms, as compared with brick materials, having been again demonstrated.

The year now closing being the third that concrete monolithic construction has been used for sewer work, sufficient time has elapsed to show the adaptation of this material to sewer work. So far there are no indications of any features of construction or use that would reverse the former decision as to the good qualities of concrete in comparison with brick.

UNION STREET

The Union street sewer laid in 1908, from Main street to Mulberry street at the top of the hill, was extended to Oak street, a distance of 1504 lineal feet. This completes the order and will enable the satisfactory disposal of storm water from the tributary area that could not be disposed of by the old sewer. A section of the old cement pipe in Union street, directly east of the new work, should be replaced with a new sewer in the near future.

MONTMORENCI STREET

A new sewer was laid in Montmorenci street as a part of the new system for that sewer district, that is tributary, the length, 612 lineal feet, extending from Chestnut to Massasoit street, inside dimensions 2' 10"x4" 5". The new sewer will provide for an extension easterly through property now being developed, when the streets of the section are defined. Ultimately the extension may be made to Armory street and Liberty street, according to the original design for the sewer, when first contemplated.

WORTHINGTON STREET

The enlarged section of the trunk sewer in Worthington street, Bowdoin street to St. James Avenue, as made a few years ago, for the prevention of back-flooding into cellars in the district tributary, required an outlet westerly from Bowdoin street to fully develop the extra capacity of the sewer enlarged; in consequence a new sewer was constructed of concrete, twenty-six inches in diameter, to act as an auxiliary, from Bowdoin street westerly into the hollow, and northerly onto private property, to a connection with the main line sewer for the so-called "Armory Hill" system, a total length of 833 feet.

OAK STREET, INDIAN ORCHARD

The cellars in the vicinity of Main and Oak streets, Indian Orchard, have been subject to more or less annoyance from flooding for several years. The Main street sewer, as laid in 1876, and designed for the conditions of storm-water discharge customary at the time, has been found inadequate to meet present conditions and the numerous extensions and tributary sewers laid since its original construction. After due examination and study it was decided that the best plan for relief would be to construct an overflow sewer, from the sewer in Main street northerly through Oak street and across the "Athol Branch" of the B. & A. R. R. and land of the Indian Orchard Company to Chicopee river, the sewer to only act when the run-off from storms shall exceed a certain limit, when the surplus will overflow through the new outlet. 684 feet of concrete sewer, circular in section, with diameter of four feet, was laid.

In addition to the above work of concrete sewer construction, there has been laid 21,081 lineal feet of vitrified pipe sewers of various sizes, from 10 to 24 inches inclusive. The total length of all sewers laid was 24,714 lineal feet, or 4.681 miles.

CEMENT PIPE

Owing to general reliability and reasonable cost of vitrified pipe, used for all pipe sewers laid since 1889, it is supplanting the old cement pipe sewers, laid prior to that date, many of which have become disintegrated, and troublesome in the maintenance of sewers and street surfaces as well. These old pipe sewers should be reconstructed as rapidly as means will permit, in order that proper sanitary conditions may be secured and maintained.

PROPOSED SEWERS

The Board of Public Works now have under consideration several petitions for sewers, some of which may be considered of more than minor importance. The territory easterly of White street, in the vicinity of Orange and Allen streets, cannot be satisfactorily sewered, the existing sewers for the most part having been laid as extensions or additions to the White street sewer, that was not at first designed to provide for such extensions. As the result the branch sewers are in some cases too shallow to afford satisfactory drainage. To meet the present needs, and also provide for adjacent new districts, now under development, it will be necessary to reconstruct existing main sewers or provide a new outlet in a different location. Studies for this district are now in progress, and doubtless recommendations will be made looking to permanent construction, with greater depth and capacity.

A large territory easterly of Massasoit and Chestnut streets, now under consideration by active real estate interests, and who now have in hand the erection of fine dwellings and the laying out and extensive grading of new thoroughfares, should be provided with suitable sewerage facilities as rapidly as development requires. The subsoil in the locality being clay to a considerable extent, drainage by cesspools is impracticable.

The extension of the sewer laid during the year through Montmorenci street to Massasoit street was designed with

special reference to meeting the necessities of this locality. A petition, now pending, involves the study for the extension of the main sewer or a large tributary into the district where Lexington avenue is now being extended east of Massasoit street. Several petitions are now pending for many smaller pipe sewers in new districts under development by real estate interests, that should have such favorable consideration as the case demands.

A tabulated statement, which includes cost and other details for sewers constructed during the year, will be found attached to this report.

STREET EXTENSIONS

Aside from the usual number of new street layouts during the year of average importance, there have been two extensions of more than usual interest to the public.

PECOUSIC AVENUE

While the order for this thoroughfare passed during the year 1908, but little was done in moving buildings, opening and improving the avenue for public travel, until the beginning of the present year. During the present year all buildings have been removed from the line of the work, with one exception. The avenue has also been graded and macadamized for a part of the roadway width, from Gardner street southerly to Main street intersection. Sidewalks and curbing have also been laid on both sides, from Gardner to York street.

NORTH STREET EXTENSION

The extension of North street southerly to the Boston & Albany railroad, at Liberty street, or the continuation of Dwight street northerly, as proposed for a long term of years, has taken a decided step forward during the year, the City Council having passed an order based on a report of the Board of Public Works for a layout sixty feet in width, covering the distance from Carew to Liberty street.

Thirty-six properties have been taken in whole or in part, and for the most part options were taken that enabled a definite understanding with the property owners concerning damages to land and buildings.

The deeds for the several parcels of land are being taken by the law department as rapidly as the investigation of titles and the preparation of deeds will permit. The sum of \$200,000 has been provided by issue of bonds for the cost of the undertaking, and it would appear that during the coming year all the buildings will be removed from the layout, and the street opened and put in condition for public travel.

The necessity for this improvement has long been recognized, and it is a remarkable fact that an extension of this character could be made through a thickly populated residential section of the city without interfering with more than one structure of greater importance than the ordinary framed dwelling.

BOARD OF PUBLIC WORKS

The usual duties have been performed for the Board during the year in connection with the numerous petitions referred by the City Council for hearings, investigation and report, most of the matters so referred requiring special surveys, plans and estimates. Also there is frequently a large amount of general clerical duty to be done connected with the petitions referred to the Board which involves the City Engineer and assistants; such matters as the extension of North street, requiring a great number of legal papers to be drawn, and the interested parties interviewed, frequently many times before final and satisfactory arrangements can be reached. The board has held fifty-three sessions during the fiscal year, as office meetings or hearings out of doors, all of which involve the attendance of the City Engineer, and an office record made.

CONNECTICUT RIVER BRIDGES

The North and South End bridges over Connecticut river, erected 1876 to 1888, not having been painted for several years, were in far worse condition than ever before, and rusting had progressed so far that the usual methods of cleaning by scraping and brushing were not sufficient to remove the rust and scale. In midsummer, the City Engineer was instructed to investigate and report upon the proper procedure, and it was advised that cleaning by sand blast only would suffice to place the iron work in suitable condition for painting. Further instructions were pursued as to the paint materials to be used. Contracts were made with the United Construction Company of Albany, N. Y., lowest bidders for the cleaning of both structures, who furnished all special labor, tools and machinery for cleaning by sand blast.

Robert L. Loudon of this city was awarded a contract as lowest bidder for the labor of painting both bridges two coats, one coat of red lead and a finishing coat of graphite or carbon paint. The North End bridge was completed late in October, and the South End bridge is nearing completion at the time of this report.

NORTH END BRIDGE REINFORCEMENTS

The two bridges referred to above, built about thirty-three years ago, of wrought iron, and of the double intersection "Warren" or lattice type, and about one-quarter of a mile long each, as first designed, were not intended for such loadings and excessive vibrations as have been brought about by the use of the North End structure for electric railway travel. The result of such use has been to badly overstrain some parts of the structure. Recent examinations show that immediate steps must be taken to reinforce the end members of all floor beams and the horizontal members of the trusses for the two end spans; also many rivets that

have worked loose under the excessive vibrations must be replaced.

A contract was made with the Walsh Boiler & Iron Works of this city, in October last, for the strengthening and renewals above mentioned, and the work is now in progress. Owing to the uncertainties of letting the work on a lump-sum basis, the repairs are to be made on force account, and a percentage paid the contractor for profit. The above repairs now being made are to be regarded as merely providing for the present safety of the public, and in addition, according to expert examination and advice, a much greater expenditure must be made in the near future to place the North End bridge in the condition the structure and public safety demand.

MILITIA RIFLE RANGE AT CHICOPEE FALLS

The new Militia Rifle Range and Club House at Chicopee Falls having been decided upon by the Committee on Finance and the officers of the militia, the City Engineer's Department was instructed to prepare the necessary plans and supervise construction, also provide such other details necessary for a complete equipment, as the officers of the militia should direct. The necessary land was purchased in 1908, which for the most part lies in Chicopee Falls, the town boundary line cutting off the southeast corner, which lies in Springfield.

A very complete shooting range, in all appointments, has been constructed, and so arranged that target practice can be had for distances of 1000, 800, 600, 500, 300 and 200 yards. The topography of the easterly end of the range, consisting of a steep sidehill facing the firing line positions, was well adapted to the location of targets. A set of four targets or butts was constructed partly up the sidehill, for practice from the 1000 and 800-yard positions, and another set of butts, containing sixteen targets, at the foot of the hill, and southerly of the firing line for longer range practice, was constructed. Both lines of butts have in front of the

targets reinforced concrete protection retaining walls, which are further protected by ample earth embankments. With each set of butts a small storehouse was provided for storage of targets and other equipment. A telephone line was constructed connecting the butts with each firing position, so that communication can be had at all times concerning the results of the practice work.

The militia officers decided that the full width of the range should be cleared, so that an unobstructed view can be had from the full width of the front of the range and club house. The range was so cleared, and the bridge over the small stream crossing the range was moved to a position southerly of the firing line.

A very complete and convenient house, of artistic design, was constructed for the use of the several companies at the foot of the range, which borders on Carew street, or "Morgan Road." The house has a piazza of ample proportions extending the full length of the house and facing the range, from all parts of which the firing line and butts can be viewed.

The interior of the house consists of one large general assembly room, with a large fireplace, and four company rooms, each provided with benches and lockers, for convenience of the militia. On the southerly end of the house is a separated toilet room of ample capacity. The house has also a full equipment of electric lights, aqueduct water, and a good drainage system. A range very complete and convenient in all appointments, has been constructed, and at a very reasonable cost.

The design and supervision of the work was placed under the direction of Assistant Engineer Edward G. Martin, who gave constant attention to the work from its first inception to the finish. The total cost of the work, when all expenses are met, amounts to about \$22,400.

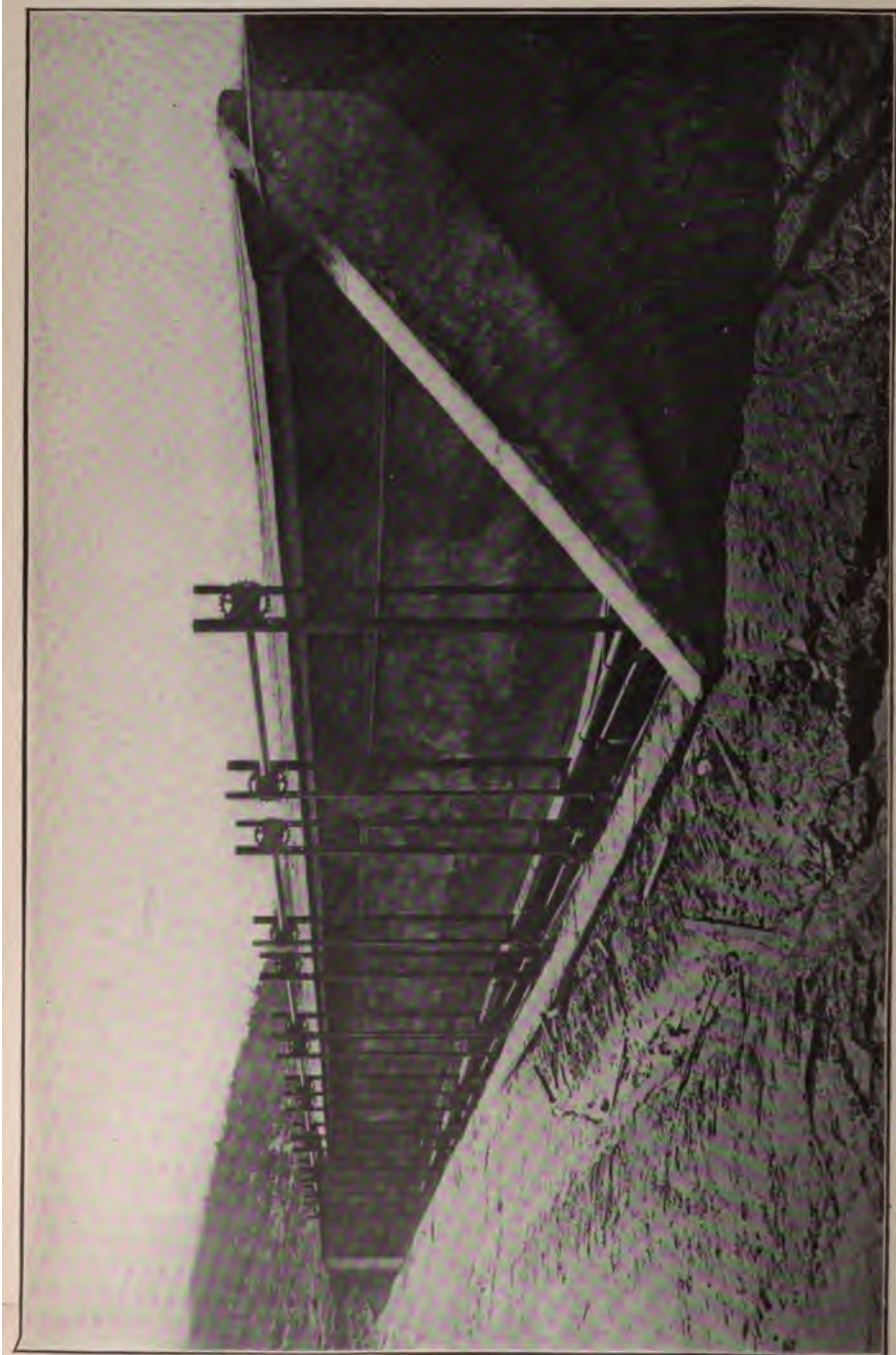


MILITIA RIFLE RANGE-CLUB HOUSE



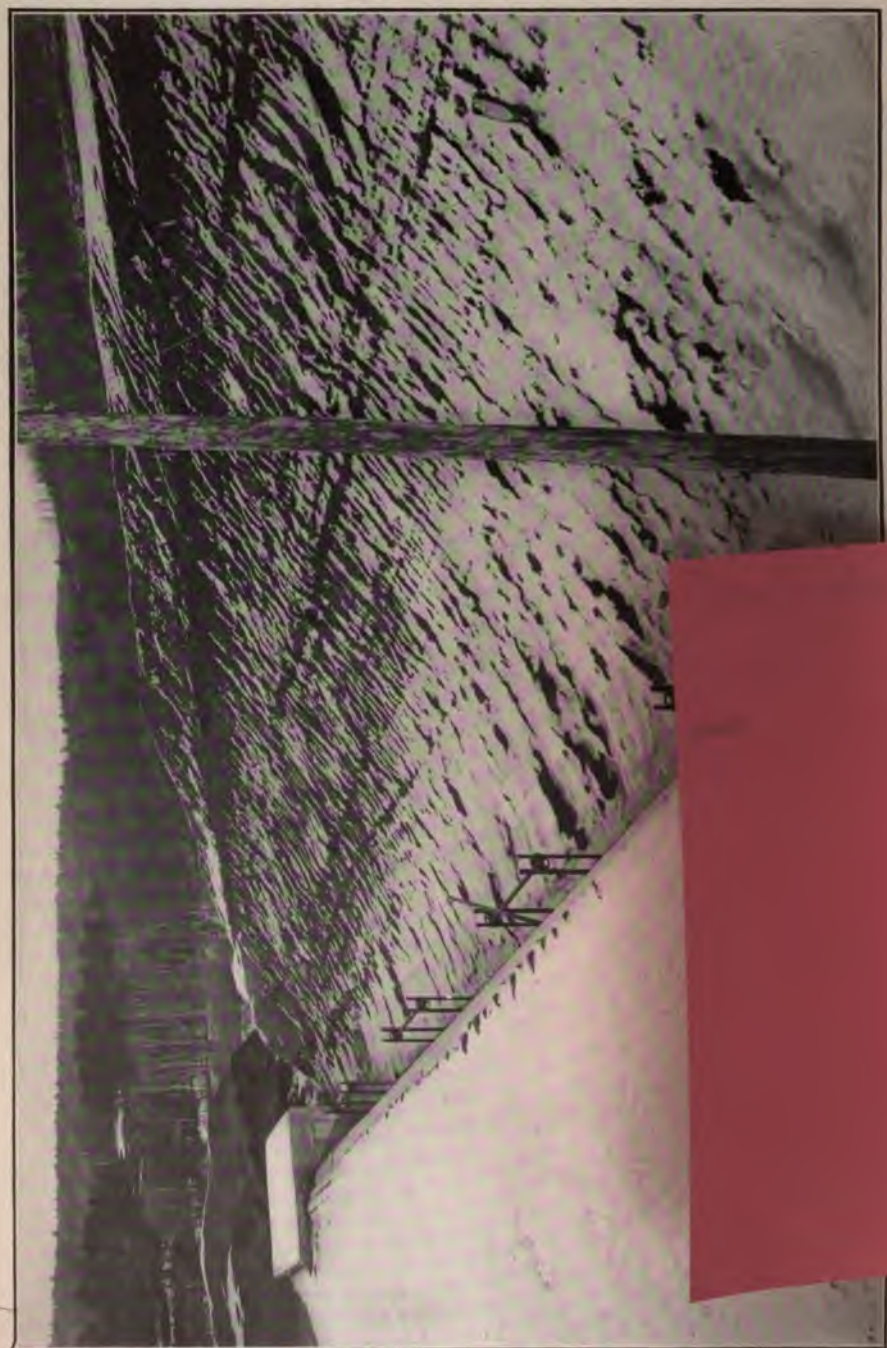
MULTIA RIFLE RANGE





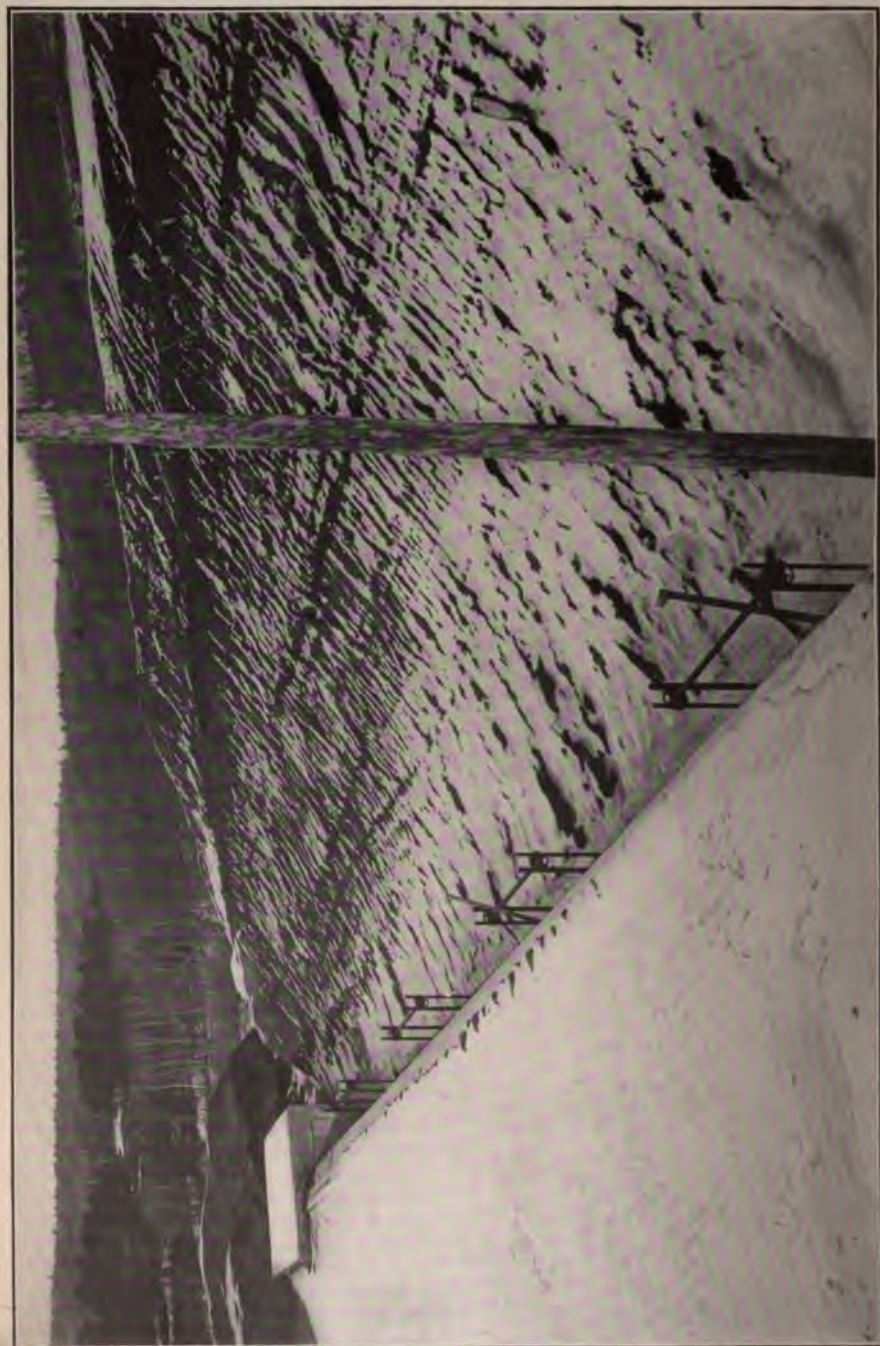
MILITIA RIFLE RANGE
Lower Targets for Short Range Work. 200, 300, 500 and 600 Yards







RIFLE RANGE



RIFLE RANGE
Target Range, Detention Wall and Back-stop for 800 and 1000 yard Practice



DEPARTMENT ASSISTANTS

The usual force of assistants has been employed during the year, with some extra service during a portion of the summer. Assistant Engineer Mr. Herbert E. Flint, as in former years, has directed the detail of the work and the office force. Assistants Mr. Edward G. Martin, Mr. Charles A. L. Wright, Mr. Ernest F. Young, Mr. Charles J. Hancock **Mr.H.T.M** and Mr. Edward W. Burnett have made up the regular office force, as for several years past. There have also been temporarily employed, Mr. G. E. Wilbur, Mr. E. T. Riley and Mr. H. W. Case.

Miss Alice M. Hancock has performed the usual duties of stenographer, typewriter and general office clerk.

Mr. Charles A. L. Wright has spent the summer and fall seasons upon the inspection of paving done by contract, and the work of cleaning and painting the North and South End bridges.

In closing I desire to thank the assistants for their cooperation in the work and the various city officials for the pleasant relations sustained and the courtesies extended.

Respectfully submitted,

CHAS. M. SLOCUM,

City Engineer.

City Engineer's Report

BOARD OF ALDERMEN, December 27, 1909.

Read, accepted, ordered printed and sent down for concurrence.

E. A. NEWELL, *Clerk.*

COMMON COUNCIL, December 27, 1909.

Read and concurred.

H. S. GILBERT, *Clerk.*

Presented to the Mayor for approval, December 29, 1909.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, Springfield, Mass., December 29, 1909.
Approved.

W. E. SANDERSON, *Mayor.*

WORK ITEMIZED

BRIDGES

REPAIRS AND CARE

	Description of Work	Cost
Abbe avenue overhead crossing,	Floor repairs,	\$274.75
Armory street, over B. & A. Railroad,	Floor repairs,	169.05
Armory street, over N. Y., N. H. & H. Railroad,	Floor repairs,	181.17
Berkshire street, Red House, crossing,	Floor repairs,	94.83
Ludlow, I. O.,	Floor and walk repairs,	339.61
Main street, I. O.,	Floor repairs,	53.92
North end, over Conn. River,	Cleaning and painting,	4,257.91
Old Toll,	Floor repairs,	552.55
Pasco street, I. O.,	New top floor,	228.83
Plainfield street,	New top floor,	208.85
South end, over Conn. River and N. Y., N. H. & H. R. R.	Cleaning and painting,	481.52
St. James avenue	Floor repairs,	2.86
		<u>\$6,845.85</u>

STREET CONSTRUCTION

Fiscal year 1909

GRADING AND GRAVELING

Street	Limits	Length in feet	Area in sq yds	Total Cost
*Chicopee road, Dickinson street, Holly street, I. O., Melrose street,	St. James avenue to Carew street, Widening westerly side, Worcester street to Berkshire street, Walnut street easterly and southerly,	2,077 1,060 445	2,974 4,240 1,450	\$1,989.64 1,473.01 843.50 225.52
		4,182	8,664	\$4,531.67

*Incomplete.

STREET CONSTRUCTION

MACADAM

Street	Limits	Length in feet	Area in sq yds	Cost per sq yd	Total Cost.
Allen street,	Extension to N. E. R. R.,	1,270	4,233	.595	\$2,518.84
Arch street,	Main street, westerly,	410	1,366	.90	†1,234.61
Beechwood street,	Sumner to Spruceland avenue,	501	1,670	.69	1,156.03
Berkshire street, I. O.,	Oak to Chestnut street,				*800.33
Hall street,		992	3,307	.56	1,846.85
Hancock street,	Florence to Clark street,	560	1,866	.566	1,057.37
Hickory street,	Extension, easterly,	1,369	3,042	.866	**2,637.75
Longhill street,	Sumner avenue to Washington boulevard,	1,741	6,837	.53	3,592.05
Plainfield street,	Extension, southerly to Newland street,	1,230	4,100	.77	†3,165.16
Randolph street,	Forest Park avenue to Maplewood terrace,	633	2,110	.62	1,314.81
Reed street,		660	2,493	.50	1,250.75
Spruceland avenue,		1,370	4,566	.62	2,810.81
Stebbins street,	State to Union street,	787	2,622	.39	1,027.27
Terrence street,		714	2,380	.56	1,330.50
Thomas street,		583	1,945	.53	1,032.65
Woodside terrace	Belmont avenue, easterly,	474	1,580	.65	1,027.83
Water street,	Mill River bridge to Gardner street, 27 ft. wide, special appropriation,	13,294	44,117		\$27,803.61
		1,925	5,775		**9,708.58
		15,219	49,892		\$37,512.19

*Additional payment covering final cost of this work will be made in fiscal year 1910.

**Cost includes grading and inlets.

†Includes cost of grading.

STREET MAINTENANCE

Fiscal Year 1909

MACADAM RESURFACING

Street	Limits	Length in feet	Area in sq yds	Cost per sq yd	Total Cost.
Bay street,	Catherine street to N. Y., N. H. & H. R. R.,	1,214			\$223.12
Belmont avenue,	Oakland street to top of hill,	2,385	5,830	.11	615.02
Central street,	Pine to Maple street,	1,460	5,866	.12	693.57
Hickory street,	Alden street, easterly	300	1,000	.49	492.72
Mill street,	Locust to Pine street,	1,040	3,812	.24	933.89
Pecousic avenue,	South end bridge, southerly	1,030	2,746	.18	509.40
Pecousic avenue	South end bridge, northerly (tar),	1,115	2,973	.66	1,960.92
Pine street	Maple to Mill street,	1,000	3,333	.16	518.93
Pine street,	Cedar to Walnut street,	1,600	5,333	.32	1,689.69
Plainfield street,	Washburn to West st, completion, 1908 work,				553.26
State street,	Benton street, easterly and westerly,	4,110	22,245	.11	2,516.46
Water street,	Bliss street to Gardner street,	2,310	7,700	.45	3,499.55
Water street,	State to Bliss street, (tar.)	280	866	.89	768.09
		17,824	61,704		\$14,974.62

GRAVEL RESURFACING.

Street	Limits	Length in feet	Area in sq. yds.	Cost per sq. yd.	Total cost
Hampden street, I. O.,	Chestnut to Holly street,	600	2,400	.11	\$273.78

SIDEWALKS AND CURBING

Fiscal year 1909

CONSTRUCTION AND RECONSTRUCTION

By orders of the City Council

Street	Length in feet	SIDEWALKS		CURBING Length in feet 4" 6"	Order Approved
		Material	Description		
Continental street,				900	Sept. 22, 1908.
Crystal avenue,	1,710	Brick,	Relaid,	1,184	Sept. 15, 1908.
Demond avenue,	970	Tar concrete,	New,		June 15, 1909.
Dickinson street,	430	Brick,	New,	385	Sept. 29, 1908.
Fisk avenue,					Oct. 13, 1908.
Liberty street,	1,996	Tar concrete,	New.		Nov. 10, 1908.
Liberty street,				2004	May 18, 1909.
Melrose street,	797	Brick,	New,	885	June 15, 1909.
Park street,	616	Brick,	Relaid,		June 3, 1909.
*Pecousic avenue,	1,159	Brick,	New,		May 1, 1909.
Phoenix street,	1,016	Tar concrete,	New,	1,310	Nov. 10, 1908.
Silver street,	800	Tar concrete,	New,	1,130	May 18, 1909.
Stebbins street,	479	Brick,	Relaid,	920	June 21, 1908.
Willard avenue,	150	Tar concrete,	New,		Oct. 13, 1908.
Willard avenue,	415	Tar concrete,	Skim-coated,		Oct. 13, 1908.
				7,408	
				1,310	

*Incomplete.

SIDEWALKS AND CURBING

CONSTRUCTION BY ORDERS OF ABUTTERS

Street	Length in feet	SIDEWALKS		CURBING Length in feet	
		Material	Description	4"	6"
*Alfred street,				41	
Arch street,				108	
Beacon street,				50	
Birnie avenue,				102	
Bloomfield street,				149	
*Donald street.				45	
Hamburg street,				71	
*Hancock street,				160	
Kensington avenue,				130	
Liberty street,	100	Tar concrete,	New,		
Longhill street,				309	
Main street,					54
*Main street, I. O.,				57	
Market street,					63
Massasoit street,				48	
North Main street,	50	Brick,	Relaid,		
Spring street,	50	Brick,	Relaid,		
State street,				417	
Water street,	2,324	Brick,	Relaid.		
*Wolcott street,				561	
				2,248	117

*Curbing furnished by owner of abutting property.

STREET CONSTRUCTION

PAVING

Street	Limits	Material	Length in feet	Area in sq yds.	Cost per sq yd	Total Cost.
Barnes street	Bridge to Hillman street,	Bitulithic,	178	552	\$2.50	\$1,381.25
Chestnut street,	Essex to Everett street,	Wood blocks,	419	1,438	3.38	4,864.30
Lyman street,	Extension easterly to Spring street,					
North Main street,	Morgan to Bancroft street,	Granite blocks	228	949	1.24	1,181.66
State street	Main street, westerly,	Wood blocks,	879	4,544	*	3,856.62
State street,	Oak to Stebbins street,	Wood blocks,	598	2,357	3.21	7,575.87
Worthington street,	Broadway to Water street,	Wood blocks,	762	3,031	3.29	9,964.88
Worthington street,	Turnout paved 1908, balance,	Wood blocks,	299	1,061	3.36	3,567.59
						174.09
			3,363	13,932		\$32,566.26

*Additional payments covering final cost of this work will be made in the fiscal year 1910

STREET MAINTENANCE

PAVING RESURFACING

Street	Materials	Area in sq yds	Cost per sq yd	Total Cost
Chestnut street,	Bitulithic,	1,446	.85	\$1,229.27
Hampden street,	Bitulithic,	360	.85	306.34
Hillman street,	Bitulithic,	35	.85	29.92
Market street,	Bitulithic,	455	.85	386.41
North Main street,	Bitulithic,	626	.85	531.76
State street,	Bitulithic,	1,902	.85	1,616.80
Walnut street,	Bitulithic,	2,238	.85	1,902.84
		7,062		\$6,003.14

MACADAM REPLACED BY PAVING

STREET	Limits	Length in feet	Area in sq yds
Barnes street,	Bridge to Hillman	178	552
Lyman street,	Extension to Spring street,	228	949
No. Main street,	Morgan to Bancroft street,	879	4,544
State street,	Main street, westerly,	598	2,357
State street,	Oak to Stebbins street,	762	3,031
Worthington street,	Broadway to Water street,	299	1,061
		2,944	12,494

PAVING REPLACED BY OTHER PAVING

GRANITE BLOCKS BY WOOD BLOCKS

STREET	Limits	Length in feet	Area in sq yds
Chestnut street	Essex to Everett	419	1,438

TABLE OF PAVED STREETS

Name	Limits	Material	Length in feet	Area in sq. yds.	Year Laid
Barnes street,		Bitulithic,	178	552	1909
Belmont avenue,	Hall street westerly,	Catskill blocks,	1,362	1,211	1901
Belmont avenue,	Hall to Oakland,	Metropolitan blocks,	1,023	914	1903
Birnie avenue,	Hooker street northerly,	Johnsonburg blocks,	145	483	1906
Bridge street,	Main to Dwight,	Rock asphalt,	688	2,525	1900
Bridge street,	Main street, 493 feet westerly,	Bitulithic,	493	1,746	1905
Bridge street,	Water street to Old Toll Bridge,	Granite blocks,	249	713	1907
Catharine street,	State to Bay,	Syracuse brick,	1,722	5,691	1900
Charles street,	Liberty to land of B. & A. R. R.	Granite blocks,	150	376	1903
Chestnut street,	Worthington to Lyman,	Granite blocks,	472	1,673	1895
Chestnut street,	Lyman to B. & A. R. R.	Granite blocks,	256	1,471	1889
Chestnut street,	B. & A. R. R. to Linden st.,	Granite blocks,	1,640	5,235	1892
Chestnut street,	Linden to Everett street,	Creo-resinate wood blks, 3" x 3½" x 6" to 10"	419	1,438	1909
Chestnut street,	Everett to Carew street,	Granite blocks,	354	718	1893
Chestnut street,	Carew to Allendale,	Syracuse brick,	1,015	3,432	1900
Chestnut street,	Allendale to Jefferson avenue,	Bitulithic,	825	2,898	1905
			317	1,149	1897
Court street,	Main to Court Square avenue,	{ Rock asphalt, Syracuse brick,	—	174	1897
		{ Syracuse brick,	—	128	1907
		{ Rock asphalt,	193	503	1897
		{ Syracuse brick,	—	330	1897
Court square avenue,	Court to Elm street,				
Cypress street,	Main street westerly,	Granite blocks,	459	1,700	1904
Cypress street,	Boylston to Fulton,	Granite blocks,	216	848	1905
Dwight street,	State to Lyman,	Syracuse brick,	2,324	9,905	1896
East Court street,	Main to Market,	Rock asphalt,	117	297	1900
Elm street,	Main to Court Square avenue,	{ Rock asphalt, Syracuse brick,	343	949	1897
			—	330	1897

TABLE OF PAVED STREETS

Name	Limits	Material	Length in feet	Area in sq yds	Year Laid
Fort street,	Main to Water,	Granite blocks	670	1,770	1895
Fulton street,	Cypress to Vine,	Granite blocks,	1,125	3,006	1906
Hampden street,	Main street westerly,	Bitulithic,	212	821	1904
Hampden street,	completion, Main to Water	Bitulithic,	394	1,539	1905
Harrison avenue,	Main to Dwight,	Trinidad asphalt,	586	2,247	1896
Hillman street,	Main to Dwight,	Bitulithic,	648	2,025	1906
King street,	St. Ky. turnout,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	317	1,023	1908
Liberty street,	Chestnut to Cass,	Syracuse brick,	1,399	4,571	1900
Liberty street,	Cass to Heywood avenue,	Syracuse brick,	1,147	3,971	1901
Lyman street,	Main to Chestnut,	Granite blocks,	1,305	4,599	1889
Lyman street,	Chestnut street, easterly,	Granite blocks,	503	2,095	1908
Lyman street,	extension easterly to Spring st.,	Granite blocks,	228	949	1909
Main street,	Locust to Marble,	Syracuse brick,	840	4,381	1897
Main street,	Marble to William,	Syracuse brick,	1,762	8,307	1896
Main street,	William to Bliss,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	1,150	6,460	1906
Main street,	Bliss to State,	Syracuse brick,	241	1,355	1893
Main street,	State to Worthington,	Creo-resinate wood bl'ks, 3" x 3½" x 8"	1,899	10,798	1904
Main street,	Worthington to Hampden, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 8"	382	1,183	1904
Main street,	Worthington to Hampden, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8"	—	962	1903
Main street,	Hampden to Lyman,	Creo-resinate wood bl'ks, 4" x 4" x 8"	153	775	1903
Main street,	Lyman to Liberty,	Creo-resinate, grooved wood bl'ks, 4" x 4" x 8"	484	2,780	1903

TABLE OF PAVED STREETS

Name	Limits	Material	Length in feet	Area in sq. yds.	Year Laid
Main street,	Liberty to Sharon, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8"	453	1,135	1903
Main street,	Liberty to Sharon, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 8" to 10"	—	1,487	1907
Main street,	Sharon to near Franklin and Emery,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	509	3,103	1907
Main street,	near Franklin, east side,	Syracuse brick,	36	144	1907
Main street,	Franklin to Carew, east side,	Syracuse brick,	1302	4,605	1897
Main street,	Emery to Sargeant, west side,	Catskill blocks,	1,447	5,449	1901
Main street,	crossing opposite Auburn street,	Catskill and Metropoli- tan blocks,	—	163	1903
Maple street,	Central to High,	Bitulithic,	1,563	5,665	1904
Maple street,	High to State,	Bitulithic,	593	2,530	1906
Market street,	State to Harrison avenue,	Bitulithic,	968	1,887	1906
North Main Street,	Plainfield to Morgan,	Bitulithic,	730	4,485	1906
North Main street,	Morgan to Bancroft street,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	879	4,544	1909
North Main street,	at Wason avenue.,	Syracuse brick,	—	196	1908
Plainfield street,	Sargeant to Fulton,	Syracuse brick,	1,710	10,249	1902
Railroad street,	Main to Water,	Granite blocks,	516	1,539	1906
Sanford street,	Main to Market,	Rock asphalt,	102	207	1900
State street,	Main street, westerly,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	598	2,357	1909
State street,	Main to Dwight,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	478	2,403	1908
State street,	Dwight to City Library,	Granite blocks,	541	1,631	1890
State street,	Dwight to Chestnut (widened),	Granite blocks,	—	217	1896
State street,	Federal to Oak,	Syracuse brick,	847	4,690	1897

TABLE OF PAVED STREETS

Name.	Limits	Material	Length in feet	Area in sq. yds	Year Laid
State street,	Oak to Stebbins street.	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	762	3,031	1909
State street,	at Walnut,	Syracuse brick,	—	278	1908
State street,	at St. James avenue,	Syracuse brick,	—	183	1907
State street,	Sherman to Highland Div., N. Y., N. H. & H. R. R.,				
Summer street,	Spring to near Autumn,	Bitulithic.	820	4,352	1905
Summer street,	Autumn to Kibbe ave.,	Granite blocks,	567	1,512	1907
Summer street,	Kibbe avenue to point 85' west of Federal,	Granite blocks,	1,259	4,029	1895
Taylor street,	Main to Dwight,	Granite blocks,	787	2,635	1901
Townley avenue,		Bitulithic.	770	2,580	1904
Walnut street,		Bitulithic.	142	214	1908
Walnut street,	State to Union,	Syracuse brick,	638	2,144	1899
Walnut street,	Union to Pendleton avenue,	Syracuse brick,	873	3,140	1900
Walnut street,	Pendleton ave. to Lebanon st.,	Bitulithic.	1,195	3,888	1905
Walnut street,	Lebanon to Hancock,	Bitulithic.	1,005	3,334	1906
White street,	Allen to Orange,	Syracuse brick,	1,610	2,400	1902
Worthington street,	Main to Dwight,	Syracuse brick,	739	2,544	1896
Worthington street,	Dwight to Fairbanks place,	Syracuse brick,	1,080	3,869	1901
Worthington street,	Fairbanks place to east line of Spring,	Syracuse brick,	269	1,003	1903
Worthington street,	Main to Broadway,	Bitulithic.	404	1,418	1905
Worthington street,	Broadway to Water street	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	299	1,061	1909
Worthington street,	at Sackett place,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	265	886	1908
Worthington street,	Federal to Armory,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10"	374	1,312	1908
Total,			57,515	217,405	

RECAPITULATION

Material	Length in feet	Length in miles	Area in sq. yds	Material	Length in feet	Length in miles	Area in sq. yds
Bitulithic,	10,940	2.072	39,934	Metropolitan blocks,	1,023	.194	996
Catskill blocks,	2,809	.532	6,741	Rock asphalt,	1,760	.333	5,630
Creo-resinate wood bl'ks,	9,421	1.784	46,738	Syracuse brick,	19,534	3.7	77,920
Granite blocks,	11,297	2.139	36,716	Trinidad asphalt,	586	.111	2,247
Johnsonburg blocks,	145	.027	483				
Total,					57,515	10.892	217,405

STREETS MADE PUBLIC

Name	Limits	Length in feet	Width in feet
Acushnet avenue,	Extension easterly,	216	48
Albany street,	Armory street, to St. James ave.,	4,411	18-40-50
Alfred street,	North Main street to Birnie ave.,	490	50
Cumberland street,	North Main street to Chestnut st.,	798	50
Daytona street,	Sumner avenue to Belmont ave.,	574	50
Firglade avenue,	Extension southerly to Washing- ton Boulevard,	549	60
Governor street,	Armory street to Penacook ave.,	1,407	50
Irvington street,	Sumner ave. to Morningside Park,	813	60
Johnson street,	Dickinson st. to Pasadena st.,	1,919	50
Kensington street,	Oakland st. to Pasadena st.,	1,784	50
Middlesex street,	Wilbraham road to Marlborough street,	775	50
North st. extension,	Carew to Liberty street,	2,244	60
North st. extension,	Harriet st. to Cumberland st.,	302	50
Pasadena street,	White street to Alderman street,	1,292	50
Randolph street,	Maplewood ter. to Forest Park av	658	50
Riverview street,	Riverview ter. to Forest Park ave.,	659	60
Washington ² Blvd.,	Pineywoods ave. to Forest Park,	547	60
3.681 miles		19,438	

STREETS RELOCATED AND WIDENED

Name	Limits	Length in feet	Width in feet
Court street,	From angle westerly to Water st.,	85	49.5
Melrose street,	Walnut street, easterly and south- erly,	490	38
Oak street, I. O., Parker st., I. O.,	} Near Boston & Albany R. R.,	219	
			794

CONCRETE SEWERS—1909

STREET	LIMITS	Size and Shape	Length in Feet	Total Cost	Total Cost per Linear Foot	No. of Man-holes	Total Cost of Man-holes	Width of Trench	Average Depth of Cutting	Material Excavated
†Montmorenci st.	Chestnut to Massasoit st.	2'-10" x 4'-5" elliptical	612	\$2,725.07	\$4.45	2	\$55.72	5.5	10.5	Sand, loam, marl, water
†Oak st. I. O.	Chicopee river to Main st.	4'-0" circular	684	4,276.11	6.25	1	31.38	7.0	11.8	Gravel, boulders
†Union st.	Ingraham ave. to Oak st.	2'-4" x 3'-8" elliptical	1,504	7,638.58	5.08	5	183.55	4.5	12.2	Sand
†Worthington st.	At Kibbe Hollow	2'-2" circular	833	2,357.86	2.83	3	51.34	4.2	7.0	Sand, loam, clay
Total			3,633	\$16,997.62			\$321.90			

†Storm water only.

1 71' of 6" underdrain and 541' of 4" underdrain.

2 258' of 6" underdrain and 420' of 4" underdrain.

‡ Does not include cost of connections to buildings or street inlets.

VITRIFIED CLAY PIPE SEWERS—1909

STREET	LIMITS	Size in Inches					Total Length in Feet	Total Cost	Per Foot	Number of Manholes	Total Cost of Manholes	Cost of Flushing	Width of Trench	Average Depth of Cutting	Materials Excavated
		24"	20"	18"	15"	12"									
Acorn st.	Sycamore to Edgewood st.	276					276	\$176.64	\$0.64	3	\$69.26		3.5	5.8	Sand.
Beacon st.	Colton st. easterly		106				106	75.08	.71	1	15.26	\$14.66	3.5	5.2	Loam.
Benton ave.	Benton st. easterly		300	325			625	345.31	.55	3	70.74		3.5	7.5	Sand.
Bristol st.	Wilburham road, southerly	299	69				368	297.39	.81	1	26.08		3.5	7.0	Sand.
Bryant st.	Extension northerly to Sumner ave.		125				125	181.96	1.22	0	46.82	23.47	3.5	7.0	Sand.
Center st.	Oak Grove ave., northerly		70				70	24.73	.35	2			3.5	3.5	Sand.
Clayton st.	Plainfield st., westerly	299					299	583.76	1.95	1	39.68		4.0	14.7	Clayey loam.
Clinton st.	Boylston to Fulton st.		150				150						3.5	8.8	Loam.
College ave.	Extension northerly to Acorn st.		136	900			1,036	419.68	.41	3	35.95	26.04	3.0	5.0	Sand.
Commerce st.	Extension southerly to Fairview st.		146				146	190.04	1.30	2	58.46		3.5	10.5	Sand.
Cumberland st.	Sumner ave. to Vermont st.	506					506	443.87	.88	1	28.73		3.7	8.5	Sand.
Cypress ave.	Extension easterly		58				58	118.19	2.04	1	30.12		4.0	8.5	Fine sand, water
Dartmouth st.	Extension northerly to King st.		40				40	23.78	.59	0			3.5	8.0	Sand.
Edgewood st.	Acorn to Bay st.	55	499	201			755	55.43	1.74	1	29.56		3.5	8.2	Sand.
Edgewood st.	State st. northerly		350				1,001	443.73	.44	3	96.96	20.85	3.5	8.5	Sand. red gravel.
Fairmount st.	Commonwealth ave. to Lawndale st.		242				350	173.17	.49	1	73.70	20.62	3.5	7.8	Sand.
Fairmount st.	Washington Blvd. to Pineywoods ave.		176				418	305.64	.95	2	34.19		3.5	7.8	Sand.
Flower st.	Water to Main st.	228	199				427	423.58	1.00	0	45.88	26.00	3.7	10.8	Sandy marl.
Gardner st.	Water to Fenwick ave.		533	117			650	118.51	1.23	0			4.0	11.8	Sand.
Governor st.	Dickinson st. to Longmeadow Line		200	199			399	311.20	.78	3	36.13		3.5	9.5	Fillng.
Hamden st.	Liberty st. westerly		424				424	302.25	1.11	0	61.92	18.36	3.5	9.5	Sand.
Hawthorn st.	Water st., easterly and Water st., westerly.	61					820	719.87	1.42	3			3.5	10.0	Sandy loam.
Hyde ave.	East ave. to Plainfield st.	301	300	210			811	712.89	.87	2	54.72	26.89	3.5	8.0	Sandy marl.
Irvine st.	Extension southerly to Morningdale Park.		286	279			565	324.11	.57	2	47.19		3.5	7.7	Sand.
Leah st.	Sumner ave. to Vermont st.		183				183	119.33	.65	2	24.96		3.5	7.4	Sand.
Logan st.	Collins to Lodi st.		40				40	119.34	1.97	0			3.5	9.5	Sand.
Loring st.	Water st., easterly		216				216	683.83	3.15	1	38.78		4.0	11.2	Sandy loam.
Lyman st.	Extension northerly to Chicopee river	414					414	471.42	1.15	1	34.53		4.0	11.2	Gravel, marl.
Marple st.	Water st., easterly		30				30	290.45	1.41	0			3.5	8.5	Sandy loam.
North st.	Extension southerly to Essex st.		149				149	102.61	.68	1	30.95	30.63	3.5	7.4	Gravel.
North st.	Extension northerly to Jefferson ave.	64					64	102.61	.68	1	37.39	20.54	3.5	7.7	Sand.
North st.	Harrie st., northerly		150				150	106.43	.71	1	27.35		3.5	7.6	Sandy marl.
Northampton ave.	Gunn Square, northerly		126				126	103.71	.82	1	21.65		3.5	4.4	Loam, mud.

VITRIFIED CLAY PIPE SEWERS—CONCLUDED—1909

STREET	LIMITS	SIZE IN INCHES					Total Length in Feet	Total Cost	Per Linear Foot	Number of Manholes	Total Cost of Manholes	Cost of Flush-gate	Width of Trench	Average Depth of Cutting	Materials Excavated
		24"	20"	18"	15"	12"	10"	8"							
Oakland st.	Belmont ave. southerly					311			\$1.06	1	\$17.00	\$23.52	3	5	Sand.
Orchard st.	Extension westerly					354					63.69	20.74	3	5	Sandy marl.
Parkside ave	Carew st. to Van Horn ave					1,351				4	106.79		3	7	Sand.
Painfield st.	Extension southerly to West st.	350	350	351	300				.87	2		25.61	3	5	Sandy marl.
Kimmon ave.	Weaver Ramble, northerly.	32	203			200			1.27	0	49.26		2	5	Sand.
Sheldon st.	Birnie ave. to North Main st.					628				2		18.49	3	5	Sandy loam.
Smith st.	Knox to Dorrie st.	311	317			165			.77	1	57.56		3	5	Sandy loam.
State st.	Walnut to Oak st.					851			.90	1	31.10		3	6	Sandy loam.
Stirling st.	Eastern ave. to Sheffield st.	250	253	348		640			1.97	3	83.49		3	7	Sand.
Stearns st.	Acorn to Bay st.					809				2	57.78		3	5	Sand.
Temple st.	Extension easterly to School st.					755			.39	3	57.50	20.79	3	5	Sand.
Trenton st.	Dickinson st. to Commonwealth ave					146			1.18	3	94.99	24.92	3	7	Sandy loam
Trout st.	Converse st. to Pomona ave.					258			.70	1	28.50		3	5	Sand.
Walden st.	Commonwealth to Belmont ave.					296			.65	4	97.36		3	7	Sand.
Waller st.	Birnie ave. to North Main st.					385			.50	1	24.82		3	5	Clayey loam.
Washington Boulevard	Extension e'y and n'y to Pineywoods ave.					1,080			1.10	2	50.85	27.05	3	5	Sand.
White st	Summer ave. to Lawrence st.	728				32			.80	4	124.53		4	0	Sand.
William st	Water st., easterly					728			1.46	2	67.69		3	5	Sand.
X Court	Dickinson st., westerly and southerly					226			1.68	0	56.45		3	5	Sandy loam.
Total		728	96	2127	2191	5555	8244	2532	21.473		\$18,584.204				
											\$2,325.80	\$308.18			

‡Retain
*Incomplete.
*Completed.
‡Built by private parties.

‡Does not include cost of connections to buildings or street inlets

*COST OF SEWER SYSTEM TO NOV. 30, 1909

YEARS	CONSTRUCTION	MAINTENANCE	TOTAL
1863-1880 inclusive	\$357,163.72	\$38,178.38	\$395,342.10
1881	43,902.05	2,359.29	46,261.34
1882	28,391.33	3,039.25	31,430.58
1883	26,573.85	4,039.33	30,613.18
1884	36,035.22	2,929.25	38,964.47
1885	29,199.74	2,477.23	31,676.97
1886	25,313.73	2,541.81	27,855.54
1887	33,967.31	2,376.47	36,343.78
1888	30,872.07	3,951.21	34,823.28
1889	24,123.28	6,056.46	30,179.74
1890	20,722.72	10,004.42	30,727.14
1891	25,568.51	6,412.75	31,981.26
1892	27,381.84	6,823.51	34,205.35
1893	25,743.24	8,553.06	34,296.90
1894	27,142.69	7,236.53	34,379.22
1895	23,905.82	7,598.31	31,504.13
1896	45,299.89	8,634.30	53,934.19
1897	33,976.14	8,790.00	42,766.14
1898	47,751.26	6,986.99	54,738.25
1899	51,246.07	8,594.56	59,840.63
1900	140,380.89	9,862.21	150,243.10
1901	80,276.02	13,272.25	93,548.27
1902	38,904.19	12,909.40	51,813.59
1903	29,169.75	9,034.88	38,204.63
1904	46,339.05	12,916.69	59,255.74
1905	40,831.47	9,620.62	50,452.09
1906	24,419.73	12,444.00	36,863.73
1907	47,977.73	10,797.97	58,775.70
1908	62,949.97	10,468.88	73,418.85
1909	39,013.60	11,002.42	50,016.02
	\$1,514,542.88	\$259,913.03	\$1,774,455.91

*Does not include cost of connections to buildings or street inlets

*PRECIPITATION FOR CALENDAR YEAR, 1909

Month	Total in Inches	Greatest Amt. in 24 Hours	Dates	Portion of Storms in which the Precipitation exceeded Half Inch per Hour	Max. Rate per Hour— Inches	Duration of Max. Rate— Minutes
Jan.	2.61	1.50	5 & 6	April 14, .78 in. in 90 min.	.52	90
Feb.	5.14	1.40	23 & 24	May 27, .89 " " 34 "	1.57	34
Mar.	2.62	1.47	25	July 16, .28½ " " 30 "	1.20	8
Apr.	6.43	4.03	14 & 15	" 18, .40 " " 50 "	.67	18
May	2.63	1.04	27	Sept. 5, .56 " " 60 "	1.17	12
June	1.33	.60	17 & 18	" 28, .22½ " " 9 "	1.50	9
July	1.49	.51	16			
Aug.	3.87	1.76	16 & 17			
Sept.	3.96	2.03	27 & 28			
Oct.	1.30	.71	12			
Nov.	1.85	.90	24 & 25			
Dec.	1.75	1.16	13 & 14			

Total 34.98

*Includes rain, melted hail, sleet and snow

Number of days in which precipitation exceeded .01 inch.....	99 days
Number of days during which snow and sleet fell.....	27 days
Date of last snowfall in spring.....	April 29
Date of first snowfall in fall.....	Nov. 23
Highest water in Connecticut river and date.....	April 16, 18.5'
Lowest water in Connecticut river and date.....	Sept. 3, 3.0'
Annual range of Connecticut river.....	15.5'
Mean daily height of Connecticut river.....	5.64'
Greatest 24-hour rise and date.....	April 15, 6.4'
Greatest 24-hour fall and date.....	April 11, 2.1'

PRECIPITATION, 1892-1909

YEAR	TOTAL IN INCHES	YEAR	TOTAL IN INCHES
1892.....	37.70	1901.....	52.34
1893.....	39.72	1902.....	46.74
1894.....	27.43	1903.....	43.91
1895.....	36.66	1904.....	39.12
1896.....	36.33	1905.....	32.83
1897.....	53.25	1906.....	42.37
1898.....	49.18	1907.....	44.11
1899.....	34.78	1908.....	36.08
1900.....	43.62	1909.....	34.98

Total.....731.15

40.62 yearly average for 18 years

GENERAL STATISTICS

CITY OF SPRINGFIELD, MASS., November 30, 1909

Springfield is situated on the east bank of the Connecticut river, in latitude 42° 06' north, longitude 72° 35' west, at an elevation above sea level of from 65 to over 215 feet.

Zero of "City Base" is 27.1 feet below sea level.

State street, at corner of Main street, is 65.9 feet above sea level, or 93 feet "City Base."

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner avenue, at corner of Belmont avenue, is 187.9 feet above sea level.

Population, estimated May 1, 1909	84,938
Number of voters: men, 14,725; women, 291; total	15,016
Number of polls, May 1, 1909	23,809
School enrollment: public, 14,968; parochial, 1,973; total	16,941
Greatest extent of city, north and south	5.9 miles
Greatest extent of city, east and west	8.9 miles
Connecticut river frontage	4.65 miles

Area, including those portions covered by water, approximately, 24,661 acres

Area by wards: Ward One, 1,733.6 acres; Two, 225.7 acres; Three, 234.8 acres; Four, 413.2 acres; Five, 400.6 acres; Six, 327.4 acres; Seven, 2,197.7 acres; Eight, 19,128.3 acres.

Total park areas, 519.82 acres; Forest Park, 476.10 acres.

Area taxed, 16,185 acres; tax rate, \$14.80 per \$1,000.

Valuation,	Real Estate	\$85,403,490	}	\$107,875,780
	Personal	22,472,290		

		Sq. Yards	Miles
Public streets accepted to Nov. 30, 1909, } miles	Wood block	46,738	1.784
	Granite block	36,716	2.139
	*Syracuse brick	77,920	3.700
	Sheet asphalt	7,877	.444
	Other brick pavers ..	8,220	.753
	Bitulithic	39,934	2.072
	Macadam	1,205,564	65.889
		Gravel or dirt	80,690
			157.471

Sidewalks laid in public streets to Nov. 30, 1909, 166.50 miles.

*Does not include brick pavement in railway tracks around Court Square.

Electric railways, Sept. 30, 1909 (double track counted twice),

In public streets.....	50.0324 miles
On private property.....	3.5015 miles
	<hr/> 53.5339 miles
Steam railroads.....	{ Four tracks, about..... 4.5 miles
	{ Double tracks, about..... 7. miles
	{ Single track, about..... 11. miles
Water mains.....	174.87 miles
Gas mains, July 1, 1909.....	132.99 miles
Sewers, 118.778 miles.....	{ Brick sewers..... 26.070 miles
	{ Vitrified clay pipe..... 64.423 miles
	{ Cement pipe..... 24.535 miles
	{ Brick, stone and plank.... .430 miles
	{ Wood pipe..... .193 miles
	{ Cast iron..... .028 miles
	{ Concrete..... 2.974 miles
	{ Brick-concrete..... .125 miles
Street lights, arc..... 1,102	Steam fire engines..... 8
Street lights, incandescent.. 144	Spare engines..... 1
Dwelling houses..... 13,413	Chemical engines..... 2
Schoolhouses..... 35	Hose wagons..... 10
Churches..... 58	Motor driven hose wagons.. 1
Post offices..... 4	Ladder trucks..... 4
Post office sub-stations..... 17	Aerial trucks..... 2
Police stations..... 2	Water towers..... 1
Railroad stations..... 5	Motor auxiliaries..... 2
Engine houses..... 12	Spare motor auxiliary..... 1
	Automobiles, Chief and Dep.
	Chief..... 2
	Trolley transportation car.. 1

CITY EXPENDITURES

Board of Health.....	\$12,209.09
City Engineering department.....	12,211.39
City Library Association.....	46,011.40
Fire department.....	\$192,484.24
Fire department, new buildings etc.....	27,342.28
	<hr/> 219,826.52

Forestry		14,822.79
	Maintenance, etc.....	\$117,376.74
	Bridges.....	6,845.85
	Paving.....	32,566.26
Highways	Macadam and gravel.....	32,335.28
and	Walks and curbing.....	12,599.06
Bridges	Special accounts.....	16,846.35
	Ashes collection.....	35,887.41
	Garbage collection.....	18,747.07
	Watering streets.....	34,742.14
Interest.....		167,590.38
Lighting streets.....		90,291.12
Little river water supply.....		1,087,256.40
North street extension.....		52,164.15
Pauper department.....		52,390.29
Police and watch.....	\$139,068.37	184,177.73
Police and watch, headquarters.....	45,109.36	
Public parks.....		43,958.39
Schools.....	\$555,545.50	646,661.24
Schools, new buildings, etc.....	91,115.74	
Sewer and drains.....		50,016.02
Water works, cash expenses.....		265,708.50



Report of

City Engineer

Springfield
Mass.



For the Year 1911



Report of

City Engineer

City of Springfield
Massachusetts

1910

REPORT OF THE CITY ENGINEER.

CITY OF SPRINGFIELD, MASS., December 27, 1910.

To the City Council:—

In accordance with the provisions of the City Ordinances, the annual report of the Engineering Department for the year 1910 is respectfully submitted, with a statement of receipts and expenditures and a general description of the more important work, also such suggestions as have been considered in order.

FINANCIAL STATEMENT.

RECEIPTS.

Annual appropriation for the year 1910,.....	\$10,900 00	
Receipts from other city departments,.....	2,199 97	
		<hr/> \$13,099 97

EXPENDITURES.

Salaries of City Engineer and assistants,.....	\$10,377 67	
Office rent and lighting,.....	566 31	
Drawing materials, stationery and general supplies,	700 98	
Car fares, automobile service and sundry office expenses,	682 72	
		<hr/> 12,327 68
Balance unexpended,		<hr/> \$772 29

DESCRIPTION OF EXPENDITURES FOR SALARIES.**ENGINEERING DEPARTMENT.**

For all services performed on account of matters referred to the Board of Public Works by the City Council relating to the laying out or alteration of streets, sidewalks, sewers, and parks; for surveys and levels, plans and profiles, estimates of cost, releases from damages, reports to the City Council, and general correspondence and interviews relating to matters referred to the Board, and all clerical work performed relating to public hearings and all meetings of the Board; measuring and assigning house numbers, work upon house number books and records, and making new plans; furnishing street lines and grades to individuals for buildings, grading, fencing and sidewalk construction; surveys, estimates, and all general services performed for the various committees of the City Council; general map, plan, and profile drawing of streets, sewers, and public property for office records and for future reference; measuring and recording all sewer connections for house drains, and furnishing lines and grades; preparation of plans and photographs for the City Solicitor's use; indexing plans and other office records; photographing and blue-printing, examination of deed records, setting of street monuments, and all other services not charged to other city departments, the sum of \$8,177.70

HIGHWAY DEPARTMENT.

For all services performed on account of and charged to the street work appropriation; estimates and plans, lines and grades for paving, macadam, and gravel, final measurements, inspection of paving and bridge repairs and maintenance, cleaning and painting South End bridge, and all other incidental work, the sum of \$513.76

SIDEWALK AND CURBING DEPARTMENT.

For all services performed for the general sidewalk and curbing appropriation; lines and grades for laying out and construction, measurements for assessments, and all work incidental thereto, the sum of \$347.14

SEWER DEPARTMENT.

For all services performed on account of the general sewer appropriation; plans, estimates, laying out of work and general supervision of construction details, and all other incidental work, the sum of \$490.60

WATER DEPARTMENT.

For all services performed for the Water Department; running street lines for laying new mains, and all incidental work, the sum of \$4.69

ASSESSORS' DEPARTMENT.

Surveys and plans, computations of areas and dimensions for plans of private property and examination of deed records, the sum of \$500.22

PARK DEPARTMENT.

For all services performed for the Park Department, the sum of \$17.58

LINCOLN SCHOOL.

Lines and grades for walks, and setting stone boundary marks, the sum of \$7.98

LIGHTING STREETS.

Plans of Main street, the sum of \$4.75

*City Engineer's Report.***POLICE DEPARTMENT.**

Surveys and plans of site for new building; plans for Commissioners showing fire alarm boxes, police signal boxes, and patrolmen's beats, the sum of \$22.75

LAW DEPARTMENT.

Determining slope of walk, Massachusetts Mutual building, the sum of \$1.34

FIRE DEPARTMENT.

Surveys, plans and examinations of deed records; also setting stone monuments (lots purchased on Dwight and Margaret street), the sum of \$8.44

PAUPER DEPARTMENT.

Making plan of entire Almshouse property and staking out curbing, the sum of \$20.49

NORTH STREET EXTENSION.

Staking out lines for opening to public travel and for grading and macadamizing, the sum of \$115.07

MILITIA RIFLE RANGE ACCOUNT.

Laying out and supervising of construction and alteration in 1909 and 1910, the sum of \$46.56

WATER STREET EXTENSION.

Grades for gutters and sewer inlets, the sum of \$2.45

HORTON AND HEMENWAY, CONTRACTORS FOR NEW AUDITORIUM BUILDING.

Staking out new Auditorium Building, the sum of \$10.06

MUNICIPAL BUILDING GROUP.

Locating new Auditorium, plans and surveys of land for connecting Police and Fire Headquarters with Municipal Group, the sum of \$29.98

WORK DONE FOR CORPORATIONS AND INDIVIDUALS.

SPRINGFIELD GAS LIGHT COMPANY.

Two copies of map of Springfield, the sum of \$20.00

UNITED ELECTRIC LIGHT COMPANY.

Staking out lines of Pecousic avenue for setting electric light poles, the sum of \$4.57

WILLIAM H. DEXTER.

Walk grades, Washington boulevard, the sum of \$2.13

FIRE AND POLICE HEADQUARTERS.

Surveys and plans and looking up deed records, property lines, site for Fire and Police Headquarters, the sum of \$29.41

DESCRIPTION OF WORK.

The work of the year has included the usual service pertaining to streets, sewers, paving and sidewalks, besides miscellaneous work performed for various city departments and Committees of the City Council. The work has been of a more general character, with but little special or unusual construction, such as has characterized the department service some years. The regular department force has been required for the performance of the work in hand, and about the usual moneys have been expended.

STREET WORK.

The regular appropriation for street work was less than the average for recent years and as a considerable part of the sum appropriated was used for general work, macadamizing, graveling, ordinary repairs and maintenance, the amount remaining for permanent paving was smaller than usual.

PAVING MATERIALS AND METHODS.

No radical changes have been introduced concerning paving materials or methods during the year. The same materials were employed that during recent years have shown adaptability and durability.

BITULITHIC.

Ferry street, with its cosmopolitan conditions, was considered one of the necessary undertakings of the year in the paving line and was paved with bitulithic, laid on a Portland cement concrete base, under a contract with Messrs. Warren Brothers, and is the only street paved with this material during the season. 3,597 square yards were laid in Ferry street, covering a length of 1,389 lineal feet. The entire street was paved with the exception of a short stretch at the Chestnut street end, covered by a 16 per cent. grade, which is too steep for the safe use of bitulithic material. Ferry street has long needed such improvement, the extremely varied character and pursuits of its residents demanding more than the usual consideration in order to promote and sustain good sanitary conditions.

BITULITHIC REPAIRS.

Eleven streets, formerly paved with bitulithic materials, have been skim-coated in part, a total surface of 1,264 square yards. Also nine streets have been treated with a flush coating covering 9,540 square yards.

CREO-RESINATE WOOD BLOCKS.

The general satisfaction during recent years, obtained by the use of wood blocks for paving, has been regarded a sufficient reason for its further use, and three streets have been paved in part with this material; North Main street, Morgan to Calhoun street; State street, Pleasant to Terrence street; Bridge street, easterly from Dwight street; a total surface of 10,688 square yards and a length of 2,226 lineal feet.

All the wood blocks were furnished from the Norfolk, Va., plant of the United States Wood Preserving Company, under the usual specification and guarantee, and were of long leaf yellow pine, subjected to usual preservative process and inspected at the works by this department. The blocks were three inches wide and three and one half inches in depth and laid on a Portland cement concrete base four and one half inches thick, with a dry mortar cushion of one half inch and the joints between blocks filled with cement mortar grout.

ASPHALT BLOCK.

The first asphalt block pavement laid by the city was laid in Bridge street, near Chestnut street, and in front of the new Hotel Kimball, during the late fall season. The grade of that part of Bridge street westerly from Chestnut is from 2.89 per cent. to 6.41 per cent., and the wood block pavement laid easterly from Dwight street was regarded too slippery for the section having the steeper grade. 712 square yards were laid, covering a length of 195 lineal feet.

The asphalt blocks, with dimensions of 3 x 5 x 12 inches, were laid on a Portland cement concrete base of 4½ inches depth, and the blocks laid on a fine gravel cushion with their smallest dimension vertical.

WORK DONE BY THE CITY.

With the exception of the bitulithic paving and repair work, all work of laying pavements was performed by the City Street Department, as has been the practice for many years.

PORTLAND CEMENT CONCRETE SIDEWALK AND CURBING.

The use of Portland cement concrete for sidewalks and curbing is deservedly increasing in popularity and extent. The Board of Public Works, in their advisory capacity, have recently decided that on all business thoroughfares this material is much more satisfactory in use, and effects greater economy than is obtained with brick or tar concrete. The cement concrete work is obtainable through local contractors at prices ranging from 90 cents to \$1.25 per square yard for four inch work, performed under standard specifications. At the prices named it will doubtless prove better economy to use the cement materials for residential and suburban districts, than the materials commonly used, in view of the longer life and freedom from repairs and relaying. Cement concrete curbing combined with a gutter was laid on both sides of Kenwood terrace, at a cost of sixty cents per lineal foot, the thickness of the curbing being six inches, and the width of curbing and gutter combined, twenty-four inches. This work has added to the good appearance of the street and facilitates cleaning as well as maintaining of proper drainage. The readiness with which cement concrete lends itself to moulding into a variety of pleasing forms adapts it to such work, and the durability, when properly made with suitable materials, is well established.

NEW STREETS. RELOCATIONS AND EXTENSIONS.

Fourteen new streets have been accepted as public ways during the year, with a total length of 8,803 lineal feet, or

1.667 miles. Seven streets have been relocated, covering a length of 2,933 lineal feet.

NORTH STREET EXTENSION.

The most important work of the year, connected with the opening of new streets, was the extension of North street, from Carew to Liberty street, a distance of 2,244 feet, and 60 feet wide throughout. A roadway 46 feet wide has been graded and macadamized. Already the great benefits to the traveling public have been fully shown in the added convenience of having another main thoroughfare of travel leading through a thickly populated part of the city, terminating directly at the Union railroad station.

When this thoroughfare is extended under the Union Station grounds to a connection with Dwight street, another main artery of travel will be provided, lying between and parallel to Main and Chestnut streets. Although involving an expenditure of nearly \$200,000 for land damages and construction, this improvement meets full public approval as a most valuable addition to our principal arteries of travel.

PECONSIC AVENUE.

The easterly line of Peconsic avenue, at the corner of Gardner street, was relocated against the Ward property to facilitate the adjustment of land damages and the width of the thoroughfare reduced from 100 to 85 feet. The other relocations were of minor importance, consisting in the main of slight changes at street intersections.

SEWER CONSTRUCTION.

The sewer work of the year has consisted of the laying of the usual amount of pipe and smaller trunk sewers. No new departures in type of construction have been made, Port-

land cement concrete having been employed as in more recent years for all sewer construction larger than twenty-four inch pipe, at a considerable saving of cost as compared with brick, and without sacrifice of quality or durability. 21,139 lineal feet of vitrified pipe sewers have been laid from 10 to 24 inches diameter inclusive, and 3,595 lineal feet of cement concrete sewers; a total length of 24,734 feet, or 4.69 miles.

CONTEMPLATED SEWER WORK.

The Board of Public Works now have under consideration the matter of providing a system of drainage for the new section lying easterly of St. James avenue and northerly of the Boston and Albany railroad. This section comprises a large tract recently cut up into lots and streets, with some broad avenues. There are also two large manufacturing plants in the same section which, at present, are without sewerage facilities. Studies are in progress for the extension of a branch from the Garden Brook system, southerly of the Boston and Albany railroad, easterly, to meet the needs of this section. Owing to the limited capacity of the Garden Brook system and the fact that it was not designed to meet the needs of the section now under development, it may be necessary to limit the proposed system to the disposal of domestic sewage only, leaving the storm water to be provided for in some other way. The real estate developments of more recent years have gone beyond the limits designed to be cared for in the original designing of parts of the present sewer system, and it may be found more practicable to introduce the so-called separate system to meet such cases. The public authorities are without information concerning the probable movement of real estate developments, and in the designing of trunk sewers to meet the demands of large areas it is difficult to foresee the future needs of the contiguous territory. It is therefore

necessary, at times, that extensions should be made of sewers to meet the requirements of adjoining tracts not at first contemplated.

GUNN SQUARE.

A considerable area now draining into Gunn Square brook has reached such a stage of development that considerable house sewage is turned into the brook, as the only available outlet at present. As a result the brook is badly polluted and some other method of disposal should be provided in the near future, in order to meet sanitary requirements.

The Mill river valley intercepting sewer, as terminated a few years ago with the junction of the Carlisle brook with Water Shops pond, will provide for the above section when suitable street layouts are made through which to extend the intercepting sewer.

A petition now pending with the Board of Public Works asks for the extension of the sewer in Massachusetts avenue to the southerly end, in order to provide drainage for new dwellings now erecting. The extreme southerly end of the street can only be drained southerly toward Westford Circle and Gunn Square brook, with the brook as an outlet. The brook cannot be connected with directly without crossing private property and to so use the brook as an outlet would be to increase the pollution.

INDIAN ORCHARD.

A large manufacturing plant is contemplated at Indian Orchard, to be located between Oak street and the Boston and Albany railroad, and the Board of Public Works have before them a petition for a sewer to provide for the district. As no sewers heretofore laid at Indian Orchard have the depth or capacity to provide for the district contemplated, on the plan of the combined system, providing for both sewage and

storm water, it will be necessary to construct a new trunk sewer of sufficient capacity to drain the entire district between Parker street and Pasco street, lying northerly of the railroad. This will require a beginning at the Main street sewer and a line some three or four thousand feet in length to reach the southerly portion of the area to be drained. An extension of the present twenty-four inch pipe sewer in Pine street, now ending at Essex street, will provide for the sewage of the locality but would not be large enough to dispose of the storm water.

CENTRAL STREET SEWER.

The sewer in Central street, laid many years ago, between Main and Maple streets, is of such faulty construction that it is a menace to the traveling public. It is also so shallow in places that it is of little use for the drainage of the deeper cellars on the street. The matter of the reconstruction of the sewer is now before the Board, who have decided to recommend its relaying as soon as the detailed studies can be prepared.

NEW STREET PROJECTS. BIRNIE AVENUE.

The Board of Public Works have under consideration the extension of Birnie avenue over Round hill to Plainfield street, which for a long time has been regarded as one of the most important extensions from the standpoint of public convenience and necessity, and which the Board contemplate working out at an early date for the final consideration of the City Council. This project has been long regarded as most essential to the rapidly growing Brightwood manufacturing district that demands a more convenient route to the Boston and Maine freight house and the northerly part of the city. Several studies are now in progress for the satisfactory solution of this extension.

LOCUST STREET EXTENSION.

The Board of Public Works have recently reported on a new street southerly of Mill river, leading from Belmont avenue and Mill street to Dickinson street. Although involving a considerable expenditure, the Board regarded the measure as of great importance to the traveling public, as it will afford a satisfactory route for the Street Railway that will serve as an outlet for the large and rapidly growing district, tributary to Dickinson street, that at present is very inadequately provided with suitable street railway accommodations. This matter is now before the City Council body for final consideration, to whom the public are looking for favorable action.

BRIDGES.

But little work has been required upon the bridges under the care of the city during the year, the painting of the iron bridges over Connecticut river having been thoroughly done in 1909 and completed during the last winter. Also the floor system of the North End bridge was reinforced and strengthened for its entire length, certain members of the built-up floor beams having been found too weak to safely sustain the excess in strains produced by the electric cars passing over the northerly side of the structure. There yet remains an extensive overhauling of the structure which should be provided in the near future, in order to place it in a condition for safe use for modern street railway traffic, the repairs made last winter being such as were necessary to place the structure in reasonably safe condition for present use.

The North End bridge when erected some thirty-five years ago, was, at the time, well proportioned for the traffic then provided for, but the conditions have so changed that the structure is not now adapted to present needs, but when

suitably reinforced, the bridge should serve well for a considerable period.

ABBE AVENUE CROSSING.

The new bridge erected over the Boston and Maine railroad in 1908, at Abbe avenue, will need some attention in the near future by way of protection of the metal, which being of mild steel rather than wrought iron is much more susceptible to rust. Doubtless some cleaning and scraping and painting should be done the coming season.

OLD TOLL BRIDGE.

The Old Toll bridge has been partly replanked. Observations are yet being made, from time to time, to determine changes in alignment.

BOARD OF PUBLIC WORKS.

The duties performed for the Board of Public Works as clerk and engineer have, as in former years, consumed a large amount of time and attention. The many petitions referred to the Board are on the increase from year to year and demand more and more time for working out complicated details, which, for the most part, falls on this department. The need for more adequate quarters in which the various office meetings and hearings can be given has for some years been felt. At present, all office meetings are held in the office of the City Engineer, where interference and interruptions are unavoidable. With the completion of the new Municipal Group it is expected the Board will be provided with more ample and convenient quarters.

During the year the Board have held eighty hearings and office meetings, all of which required clerical service and a record. The time consumed in draughting reports, making

plans and estimates, interviewing parties for obtaining special rights and releases from damages, is rapidly increasing and has for several years required a very considerable part of the duties of the City Engineer and the department.

TABLES.

In connection with the printed report will be shown the usual tables relating to work done, costs and other details.

DEPARTMENT ASSISTANTS.

The usual force of assistants has been employed during the year, with some extra service during a portion of the summer. Assistant Engineer Mr. Herbert E. Flint, as in former years, has directed the detail of the work and the office force. Assistants Mr. Edward G. Martin, Mr. Charles A. L. Wright, Mr. Ernest F. Young, Mr. Charles J. Hancock, and Mr. Edward W. Burnett have made up the regular office force, as for several years past. There have also been employed during a portion of the year, Mr. H. T. Murphy, Mr. E. T. Riley, Mr. H. W. Case, Mr. R. W. Greenwood, Mr. G. W. Schwenger, and Mr. I. P. Salisbury.

Miss Alice M. Hancock has performed the usual duties of stenographer, typewriter and general office clerk.

In closing I desire to thank the assistants for their coöperation in the work and the various city officials for the pleasant relations sustained and the courtesies extended.

Respectfully submitted,

CHAS. M. SLOCUM,

City Engineer.

City Engineer's Report.

BOARD OF ALDERMEN, December 28, 1910.

Read, accepted, ordered printed, and sent down for concurrence.

E. A. NEWELL, *Clerk.*

COMMON COUNCIL, December 28, 1910.

Read and concurred.

GEO. J. CLARK, *Clerk.*

Presented to the Mayor, for approval, December 29, 1910.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, SPRINGFIELD, MASS., December 29, 1910.

Approved.

EDWARD H. LATHROP, *Mayor.*

WORK ITEMIZED.

BRIDGES.

REPAIRS AND CARE.

	Description of Work.	Cost.
Abbe avenue overhead crossing,	Floor and railing repairs,	\$41 61
Armory street, over B. & A. Railroad,	Floor repairs,	26 04
Berkshire street, Red House crossing,	Floor repairs,	8 55
Ludlow, I. O.,	New top floor,	395 36
Main street, I. O.,	Floor repairs,	56 62
North end, over Conn. River,	Painting and strengthening floor system,	*3,493 20
Old Toll,	New floor, northerly roadway,	1,039 56
Pasco street, I. O.,	Floor repairs,	16 04
Plainfield street,	Floor repairs,	49 13
South end, over Conn. River, and N. Y., N. H., & H. Railroad,	Painting,	5,347 40
St. James avenue,	Floor repairs,	3 00
		\$10,476 51

* Contains amounts chargeable to the Springfield Street Railway Company and the Town of West Springfield.

STREET CONSTRUCTION.

Fiscal year 1910.

GRADING AND GRAVELING.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Boston road, Chicopee road, com- pletion of 1909 work, Chicopee road, Johnson street, Kensington avenue, Oak street, I. O., Pasadena avenue,	Parker street to Wilbraham line, St. James avenue to Carew street, Liberty street northwesterly, Dickinson street to Pasadena avenue, At Parker street,	4,100 2,760 1,500 1,915 800 500 1,230 12,805	6,833 9,200 3,333 6,383 2,666 1,666 4,100 34,181	\$0 31 57 15 137 19 13	\$2,112 46 3,911 69 *1,906 26 972 60 363 33 317 61 531 77 \$10,115 72

* Includes cost of grading.

STREET CONSTRUCTION.

MACADAM.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Berkshire street, I. O., completion, Court street,	Oak to Chestnut street, Water street easterly,	1,400 144	6,533 480		\$898 14 824 79
Crystal avenue, Cumberland street,	North to Chestnut street, Marengo Park to Sumner avenue,	930 426 3,074	3,100 1,420 8,540	80 53 61 52	1,647 37 872 90 4,422 13
Dickinson street, Fairfield street, Firglade avenue, Fort Pleasant ave., Greenleaf street, Hancock street, com- pletion,		882 1,049 2,674 740	2,940 3,490 7,252 3,098	62 49 57 496	1,814 16 1,699 04 4,148 79 1,537 79
Harriet street, Keith street, Litchfield street, *Longmeadow street, North street, **North street Ex- tension,	Florence to Clark street, Long Hill street to Longmeadow line, Waverly to Cumberland street, Liberty to Carew street,	816 1,107 384 2,930 498 2,243	2,720 3,690 1,280 7,813 1,660 7,477	50 48 59 48	43 25 1,345 80 1,791 12 761 30 794 19

* This was done at the expense of the Park Department. ** This was done under special appropriation.

STREET CONSTRUCTION.

MACADAM—CONTINUED.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Northampton ave.,	Wilbraham road to Beverly street,	1,229	4,096	\$0 37	\$1,531 76
*Pecousic avenue,	Long Hill street northerly,	1,420	3,313		
White street,	School lot to Longmeadow line,	4,926	10,735	72	7,737 88
Wilbraham avenue,		2,046	6,820	48	3,312 05
		28,918	86,457		\$35,182 46

* This was done at the expense of the Park Department.

STREET MAINTENANCE.

Fiscal year 1910.

MACADAM RESURFACING.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Fort Pleasant ave.,	West side,	2,640	9,386	\$0 21	\$1,979 77
Hancock street,	State to Walnut street,	3,184	10,613	24	2,527 06
Locust street,	East side,	800	1,422	24	342 75
Maple street,	Central street southerly,	800	2,666	35	930 06
Park street,	Willow street easterly,				550 78
St. James avenue,	State to Thompson street,	1,635	4,305	365	1,572 80
Walnut street,	Hickory street northerly (west side),	410	591	45	265 72
Walnut street,	Hancock street southerly,	780	1,040	257	266 16
Wason avenue,		500	2,100	23	483 12
Worthington street, incomplete,	Spring street easterly,	1,190	3,305		69 75
		11,939	35,428		\$8,987 97

TAR AND OIL TREATMENTS.

Street.	Limits.	Material.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost
Boston road,	State street to Wilbraham line,	Texas road oil,	17,900	29,833	\$0.01	\$309 75
Pecousic avenue,	South end bridge northerly,	Tar and asphalt,	1,100	3,666	045	166 38
Pecousic avenue,	South end bridge southerly,	Tar surfacing,	1,420	3,313	068	224 63
Springfield street,	Chestnut street northeasterly,	Standard macad- am binder A,	3,858	6,858	148	1,015 37
Springfield street,	Opposite hospital,	Asphaltoilene,	300	538	386	393 82
State st., north side,	Chicopee line southwesterly, Almshouse to Berkshire ave.,	Asphaltoilene, Standard macad- am binder A,	360	640		
State st., south side,	Almshouse to Warner's,	Standard macad- am binder A,	1,992	3,984	22	1,178 85
State st., south side,	Warner's to Berkshire ave.,	Asphaltoilene,	692	1,384	11	398 73
Sumner ave., south- erly side,	Fort Pleasant ave. to Forest Park ave., resurfacing,	Tar and asphalt mixture,	1,300	2,600	45	1,432 83
Wilbraham road, southerly side,	Homer to Benton street,	Asphaltoilene,	1,420	3,155	127	610 28
Wilbraham road,	Benton street to Wilbraham line,	Texas road oil,	2,550	4,816	0076	246 12
			19,375	32,292		\$5,976 76
			52,267	93,074		

GRAVEL RESURFACING.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Berkshire avenue,	Chestnut street to Red House Crossing, west side,	7,507 }	35,364	\$0 05	\$1,761 94
	Chestnut street to State, east side,	15,167 }			
		22,734	35,364		\$1,761 94

SIDEWALKS AND CURBING.

Fiscal year, 1910.

CONSTRUCTION AND RECONSTRUCTION.

By orders of the City Council.

Street.	Length in feet.	SIDEWALKS.		CURBING. Length in feet. 4'' 6''	Order approved.
		Material.	Description.		
Avon place,	50	Brick,	New,		May 8, 1910.
Beacon street,	517	Tar concrete,	New,		Nov. 23, 1909.
Beacon street,	7	Tar concrete,	Skim coat,	126	Nov. 23, 1909.
Belmont avenue,	379	Tar concrete,	New,		Nov. 23, 1909.
Bridge street,	105	Brick,	Relaid,		Sept. 20, 1910.
Burr street,	858	Tar concrete,	New,		Sept. 28, 1909.
Burr street,	139	Tar concrete,	Skim coat,	1,065	Sept. 28, 1909.
Dawes street,	171	Tar concrete,	New,		Dec. 21, 1909.
Dawes street,	2,261	Tar concrete,	Skim coat,	2,514	Dec. 21, 1909.
Douglas street,	483	Brick,	Relaid,		July 20, 1909.
Firglade avenue,	285	Tar concrete,	New,		June 15, 1909.
Foster street,		Brownstone curb,		33	May 25, 1910.
Harriet street,	832	Brick,	New,	1,497	Apr. 20, 1910.
Kensington avenue,	2,283	Tar concrete,	New,		July 12, 1910.
King street,	217	Tar concrete,	New,		May 3, 1910.
Kenwood terrace,		Concrete curb and gutter,		1,059	June 7, 1910.

SIDEWALKS AND CURBING.—CONTINUED.

Street.	SIDEWALKS.		CURBING. Length in feet. ft.	Order approved.
	Length in feet.	Material.	Description.	
No. Main street,	831	Brick.	Relaid,	Sept. 20, 1910.
Park street,	373	Brick,	Relaid,	Nov. 23, 1909.
Vermont street,	294	Tar concrete,	New,	May 24, 1910.
Warner place,	271	Brick,	Relaid,	Sept. 28, 1909.
Willow street,	149	Brick,	Relaid,	Nov. 23, 1909.
Wolcott street,				June 15, 1909.
			306	
			4,044	
			2,556	

SIDEWALKS AND CURBING.

CONSTRUCTION BY ORDERS OF ABUTTERS.

Street.	Length in feet.	SIDEWALKS.		CURBING.	
		Material.	Description.	Length in feet. 4"	6"
Arch street,					166
Ashley street, corner Walnut,				79	
Beaumont street,				50	
Clinton street,				25	
Colton street,	63	Tar concrete,	Skim coat,	67	
Cumberland street,					392
Dawes street,	115	Tar concrete,	Skim coat,		
Ferry street,	175	Brick,	Relaid,	110	
Franklin street,				69	
King street,				30	
Ledyard street,				90	
Massasoit street,				713	
North street,					275
Pineywoods avenue,				259	
*State street,					102
White street,	22	Tar concrete,	Skim coat,	529	
Wilmont street,				42	
				2,063	935

* Curbing furnished by abutter.

STREET CONSTRUCTION.

PAVING.

Street.	Limits.	Material.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Bridge street,	Dwight to Chestnut street,	Wood blocks,	122	446		*\$1,466 83
Ferry street,	Main street easterly to foot of hill,	Asphalt blocks,	195	712		
North Main street,	Balance of 1909 work,	Bitulithic,	1,389	3,597	\$2 75	9,891 30
North Main street,	Bancroft to Calhoun street,	Wood blocks,	839	4,210		9,938 02
State street,	Pleasant to Terrence street,	Wood blocks,	386	1,497		*5,089 25
		Wood blocks,	2,931	10,462		*4,357 66
						\$30,693 06

* Incomplete.

STREET MAINTENANCE.**PAVING RESURFACING.****BITULITHIC SKIM COATING.**

Street.	Area in sq. yds.	Cost.
Bridge street,	101.1	\$101 10
Chestnut street,	155.1	155 10
Hampden street,	16.5	16 50
Harrison avenue,	29.9	29 90
Hillman street,	134.8	134 80
Maple street,	594.2	594 20
Market street,	8.2	8 20
North Main street,	32.	32 00
State street,	137.	137 00
Walnut street,	15.5	15 50
Worthington street,	24.	24 00
	1,248.3	\$1,248 30

BITULITHIC FLUSH COATING.

Street.	Area in sq. yds.	Cost.
Chestnut street,	331.9	\$33 19
Hampden street,	139.5	13 95
Hillman street,	726.5	72 65
Maple street,	1,340.8	134 08
Market street,	740.8	74 08
North Main street,	2,216.8	221 68
State street,	318.6	31 86
Walnut street,	3,076.2	307 62
Worthington street,	447.6	44 76
	9,338.7	\$933 87

MACADAM REPLACED BY PAVING.

STREET.	Limits.	Length in feet.	Area in sq. yds.
Bridge street,	Dwight to Chestnut,	318	1,158
Ferry street,	Main street to foot of hill,	1,357	3,441
North Main street,	Bancroft to Calhoun,	839	4,210
State street,	Pleasant to Terrence,	386	1,497
		<hr/> 2,900	<hr/> 10,306

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Barnes street,	Hall street westerly, Hall to Oakland, Hooker street northerly, Main to Dwight, Dwight to Chestnut,	Bitulithic,	178	552	1909
Belmont avenue,		Catskill blocks,	1,362	1,211	1901
Belmont avenue,		Metropolitan blocks,	1,023	914	1903
Birnie avenue,		Johnsouburg blocks,	145	483	1906
Bridge street,		Block asphalt,	688	2,525	1900
Bridge street,		Creo-resinate wood bl'ks, 3" x 3½" x 8",	122	446	1910
		Asphalt blocks, 5" x 12" x 3",	195	712	1910
Bridge street,	Main street, 493 feet westerly. Water street to Old Toll bridge, State to Bay, Liberty to land of B. & A. R. R., Worthington to Lyman, Lyman to B. & A. R. R., B. & A. R. R. to Linden, Linden to Everett,	Bitulithic,	493	1,746	1905
Bridge street,		Granite blocks,	249	713	1907
Catharine street,		Syracuse brick,	1,722	5,691	1900
Charles street,		Granite blocks,	150	376	1903
Chestnut street,		Granite blocks,	472	1,673	1895
Chestnut street,		Granite blocks,	256	1,471	1889
Chestnut street,		Granite blocks,	1,640	5,235	1892
Chestnut street,		Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	419	1,438	1909
Chestnut street,		Granite blocks,	354	718	1893
Chestnut street,		Syracuse brick,	1,015	3,432	1900
Chestnut street,	Allendale to Jefferson avenue,	Bitulithic,	825	2,898	1905

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Court street,	Main to Court Square avenue,	{ Rock asphalt, Syracuse brick,	317	1,149	1897
		{ Syracuse brick,	—	174	1897
		{ Rock asphalt,	193	503	1897
		{ Syracuse brick,	—	330	1897
Court square avenue,	Court to Elm,	{ Granite blocks,	459	1,700	1904
Cypress street,	Main street westerly,	{ Granite blocks,	216	848	1905
Cypress street,	Boylston to Fulton,	Syracuse brick,	2,324	9,905	1896
Dwight street,	State to Lyman,		117	297	1900
East Court street,	Main to Market,	Rock asphalt,	343	949	1897
Elm street,	Main to Court Square avenue,	{ Rock asphalt, Syracuse brick,	—	330	1897
Ferry street,	Main street to foot of hill,	Bitulithic,	1,389	3,597	1910
Fort street,	Main to Water,	Granite blocks,	670	1,770	1895
Fulton street,	Cypress to Vine,	Granite blocks,	1,125	3,006	1906
Hamden street,	Main street westerly,	Bitulithic,	212	821	1904
Hamden street,	completion, Main to Water,	Bitulithic,	394	1,539	1905
Harrison avenue,	Main to Dwight,	Trinidad asphalt,	586	2,247	1896
Hillman street,	Main to Dwight,	Bitulithic,	648	2,025	1906
King street,	St. Ry. turnout,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	317	1,023	1908

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Liberty street,	Chestnut to Cass,	Syracuse brick,	1,399	4,571	1900
Liberty street,	Cass to Heywood avenue,	Syracuse brick,	1,147	3,971	1901
Lyman street,	Main to Chestnut,	Granite blocks,	1,305	4,599	1889
Lyman street,	Chestnut street, easterly,	Granite blocks,	503	2,095	1908
Lyman street,	extension easterly to Spring st.,	Granite blocks,	228	949	1909
Main street,	Locust to Marble,	Syracuse brick,	840	4,381	1897
Main street,	Marble to William,	Syracuse brick,	1,702	8,307	1896
Main street,	William to Bliss,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	1,150	6,460	1906
Main street,	Bliss to State,	Syracuse brick,	241	1,355	1893
Main street,	State to Worthington,	Creo-resinate wood bl'ks, 3" x 3½" x 8",	1,899	10,798	1904
Main street,	Worthington to Hampden, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 8",	382	1,183	1904
Main street,	Worthington to Hampden, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8",	—	962	1903
Main street,	Hampden to Lyman,	Creo-resinate wood bl'ks, 4" x 4" x 8",	153	775	1903
Main street,	Lyman to Liberty,	Creo-resinate grooved wood bl'ks, 4" x 4" x 8",	484	2,780	1903

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Main street,	Liberty to Sharon, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8",	458	1,135	1903
Main street,	Liberty to Sharon, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 8" to 10",	—	1,487	1907
Main street,	Sharon to near Franklin and Emery,	Creo-resinate wood bl'ks, 3" x 3½" x 8" to 10",	509	3,103	1907
Main street,	near Franklin, east side,	Syracuse brick,	36	144	1907
Main street,	Franklin to Carew, east side,	Syracuse brick,	1,302	4,605	1897
Main street,	Emery to Sargeant, west side,	Catskill blocks,	1,447	5,449	1901
Main street,	crossing opposite Auburn street,	Catskill and Metropoli- tan blocks,	—	163	1903
Maple street,	Central to High,	Bitulithic,	1,563	5,065	1904
Maple street,	High to State,	Bitulithic,	593	2,530	1905
Market street,	State to Harrison avenue,	Bitulithic,	968	1,887	1906
North Main street,	Plainfield to Morgan,	Bitulithic,	730	4,485	1906
North Main street,	Morgan to Bancroft,	Creo-resinate wood bl'ks, 3" x 3½" x 8" to 10",	879	4,544	1909
North Main street,	Bancroft to Calhoun,	Creo-resinate wood bl'ks, 3" x 3½" x 8" to 10",	839	4,210	1910
North Main street,	at Wason avenue,	Syracuse brick,	—	196	1908
Plainfield street,	Sargeant to Fulton,	Syracuse brick,	1,710	10,249	1902

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Railroad street,	Main to Water,	Granite blocks,	516	1,539	1908
Sanford street,	Main to Market,	Rock asphalt,	102	207	1900
State street,	Main street, westerly,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	598	2,357	1909
State street,	Main to Dwight,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	478	2,403	1908
State street,	Dwight to City Library,	Granite blocks,	541	1,631	1890
State street,	Dwight to Chestnut (widened),	Granite blocks,	—	217	1896
State street,	Federal to Oak,	Syracuse brick,	847	4,590	1897
State street,	Oak to Stebbins,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	762	3,031	1909
State street,	Pleasant to Terrence,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	386	1,497	1910
State street,	at Walnut,	Syracuse brick,	—	278	1908
State street,	at St. James avenue,	Syracuse brick,	—	183	1907
State street,	Sherman to Highland Div., N. Y., N. H. & H. R. R.,	Bitulithic,	820	4,352	1905
Summer street,	Spring to near Autumn,	Granite blocks,	567	1,512	1907
Summer street,	Autumn to Kibbe avenue,	Granite blocks,	1,259	4,029	1895
Summer street,	Kibbe avenue to point 85' west of Federal,	Granite blocks,	787	2,685	1901

TABLE OF PAVED STREETS.

Material.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Taylor street,	Main to Dwight,	Bitulithic,	770	2,580	1904
Townsey avenue,		Bitulithic,	142	214	1908
Walnut street,	State to Union,	Syracuse brick,	638	2,144	1899
Walnut street,	Union to Pendleton avenue,	Syracuse brick,	873	3,140	1900
Walnut street,	Pendleton ave. to Lebanon st.,	Bitulithic,	1,195	8,888	1905
Walnut street,	Lebanon to Hancock,	Bitulithic,	1,005	3,334	1906
White street,	Allen to Orange,	Syracuse brick,	1,610	2,400	1902
Worthington street,	Main to Dwight,	Syracuse brick,	739	2,544	1896
Worthington street,	Dwight to Fairbanks place,	Syracuse brick,	1,060	3,869	1901
Worthington street,	Fairbanks place to east line of Spring,	Syracuse brick,	269	1,003	1903
Worthington street,	Main to Broadway,	Bitulithic,	404	1,418	1905
Worthington street,	Broadway to Water street,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	299	1,061	1909
Worthington street,	at Sackett place,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	265	886	1908
Worthington street,	Federal to Armory,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	374	1,312	1908
Total,			60,446	227,867	

RECAPITULATION.

Material.	Length in feet.	Length in miles.	Area in sq. yds.	Material.	Length in feet.	Length in miles.	Area in sq. yds.
Bitulithic,	12,329	2.335	43,531	Metropolitan blocks,	1,023	.194	996
Catakill blocks,	2,809	.532	6,741	Rock asphalt,	1,760	.333	5,630
Creo-resinate wood blocks,	10,768	2.039	52,891	Syracuse brick,	19,534	3.7	77,920
Granite blocks,	11,297	2.140	36,716	Trinidad asphalt,	586	.111	2,247
Johnsonburg blocks,	145	.027	483	Asphalt blocks,	195	.037	712
				Total,	60,146	11.448	227,867

STREETS MADE PUBLIC.

BY ORDERS OF THE CITY COUNCIL.

Name.	Limits.	Length in feet.	Width in feet.
Beaumont street,	Sumner avenue to Belmont avenue,	374	50
By road,	Springfield to Armory street,	1,355	60
Kenwood terrace,	Sumner avenue to Belmont avenue,	523	80
Laurel avenue,	Plainfield street to top of bank of Connecticut River,	896	50
Lester street,	Sumner avenue to Vermont street,	635	50
Massasoit street,	Near Montmorenci street northerly,	32	50
Massasoit street,	Chapin terrace to Pratt street,	460	50
North street,	Waverly to Harriet street,	275	50
Ozark street,	Orange street to Grand street,	554	50
Pratt street,	Chestnut to Massasoit street,	588	50
Ranney street,	Orange to Alderman street,	1,426	50
Sumner terrace,	Sumner avenue northerly,	474	80
Warwick street,	Extension easterly to Armory street,	398	40
Wellington street,	Wilbraham road to Marlborough street,	813	48
	1.667 miles,	8,803	

STREETS RELOCATED AND WIDENED.

BY ORDERS OF THE CITY COUNCIL.

Name.	Limits.	Length in feet.	Width in feet.
Bay Road,	Near Oak Grove Cemetery		
	to Berkshire avenue,	1,666	
Bridge and Chestnut streets,	Southerly corner,	18	
Chestnut street,	Ferry street southerly,	80	
Dickinson and			
Wilmont streets,	Easterly corner,	35	
Pecousic avenue,	Gardner street southerly,	134	
		1,933	

SINTERIFIED CLAY PIPE SEWERS—1910.

STREET.	LIMITS.	Size in inches.					Total Length per 10' in feet.	Total Cost.	Total Cost per lin. ft.	Average depth of trench in ft.	Width of Trench.	Material Excavated.
		24	30	18	15	12						
Adams st.	Main to Ashmun st.	294	245	323	221		1,083	\$3,267.83	\$3.02	10.0	6.0	Black loam, fine blue sand
Ashmont st.	Belmont ave., northerly				290		430	351.57	.78	8.2	3.7	Sand
Bay st.	Cambridge to Sycamore st.	332	360				692	1,348.03	1.95	12.0	4.0	Sand
Birnie ave.	Extension northerly and easterly to North Main st., easterly	534					708	951.91	1.35	6.5	4.0	Clay and fine sand
Blake Hill.	Fort Pleasant ave., easterly				33		33	18.34	.55	6.0	3.7	Clay
Bloomfield st.	Extension easterly				36		36	38.61	1.07	11.3	3.7	Sand
Howes st.	Bay st., southerly				64		64	115.95	1.81	13.5	3.7	Sand
Bristol st.	Extension southerly from Marlborough st.				401		401	392.06	.61	4.2	3.5	Sand
Cass st.	Liberty st., northerly				197		197	253.37	1.29	8.0	3.5	Sand and clay
Cherryln ave.	Extension southerly				681		681	574.73	.88	9.2	3.7	Sand
Clayton st.	Extension westerly				100		100	163.91	1.64	13.0	3.5	Marl
Clyde st.	Plainfield st., westerly				370		971	1,519.51	1.56	8.9	3.7	Marl
Concord terrace.	Willraham road, northerly				253		253	225.05	.90	8.6	3.5	Sand
Dwight st.	Harrison ave., northerly				129		129	129.15	1.49	9.6	4.5	Clay and loam
Everett st.	Cass st., easterly				313		313	553.74	1.77	8.6	3.7	Clay
Farnsworth st.	Extension northerly to Chicopee line				264		264	827.14	1.04	9.7	3.8	Sand
Florence st.	Extension easterly				26		26	31.11	1.20	8.9	3.7	Loam
Girard ave.	Pay st., southerly				86		86	102.05	1.19	11.7	3.7	Sand
Governor st.	Extension easterly to Penacook ave.				328		1,355	1,157.68	.85	8.0	4.0	Sand
Greenwood st.	Extension easterly to near Chestnut st.				448		448	716.57	1.27	8.6	3.7	Clay and loam
Home st.	Penacook ave., easterly				246		246	184.02	.76	6.0	3.5	Sand
Ionia st.	State st., northerly				720		720	445.92	.62	7.8	3.5	Sand and red gravel
Kensington av.	Extension easterly to Pasadena st.				767		767	665.61	.73	8.7	3.7	Sand
King st.	Hancock st., easterly to Eastern ave.				399		1,396	2,550.91	1.90	11.2	3.5	Sand and loam
Leiyard st.	Armory st., westerly				478		478	321.80	.67	7.0	3.7	Sand and clay
Massasoit st.	Carew st., northerly, extension				131		131	113.22	.86	6.7	3.5	Clay and loam
Massasoit st.	Lexington ave., southerly, extension				48		48	104.30	2.26	6.3	3.5	Clay and loam
Merrick ave.	King st., southerly				24		24	25.26	1.22	9.5	3.5	Sand
Mill st.	Knox to Maple st.				352		352	666.24	1.90	6.9	4.5	Rock, hardpan and loam
Newland st.	Plainfield st., westerly				350		350	1,353.99	1.83	9.8	3.7	Marl
Northampton ave.	Gunn square to King st.				240		202	325.24	.72	6.8	3.5	Loam
North Main st.	Chicopee line, southerly				106		106	173.58	1.61	7.6	3.7	Marl
Oak (grove) ave.	Bay st., southerly				350		301	1,060.41	1.09	10.0	3.7	Sand and hardpan
Orlando st.	Summer ave., southerly				127		240	310.17	.94	9.1	3.5	Sand
Oxford st.	Riverview terrace, northerly				227		291	512.04	.99	8.5	3.7	Sand and clay

VITRIFIED CLAY PIPE SEWERS—1910.—CONTINUED.

STREET.	LIMITS.	Size in Inches. 24" 20" 18" 16" 12" 10"	Total Length in feet.	Total Cost. per lin. ft.	Total Cost lin. ft.	Average depth of cutting, in ft.	Width of Trench.	Material Excavated.
Peabody lane.....	Extension westerly.		76		\$97.70	6.0	3.5	Filling, etc.
Pensacook ave.....	Governor to Home st.	106	106		76.42	7.0	3.5	Sand
Ranney st.....	Kensington ave. northerly.		206		149.16	7.2	3.5	Sand
Rapalus ave., I. O.....	Parter st., southerly	44½	442		429.47	.97	3.5	Sand
Ritchell court.....	Extension southerly		55		51.23	.93	3.0	Clay and loam
Ridgewood place.....	Extension northerly		76		101.35	1.34	3.5	Sand
Ridgewood terrace.....	Union st., southerly		137		118.83	.87	3.0	Mari and loam
Rochelle st.....	Wilbraham road, southerly		424		452.68	1.07	4.0	Sand
Smith st.....	Extension easterly to Castle ave.		107		136.68	1.28	3.0	Sand
Sunner ave.....	Extension easterly to Castle ave.	739 260	989		1,038.85	1.05	4.5	Sand and clay
Walker st.....	Water st., westerly.	650	650		684.37	1.06	3.5	Sand and loam
Washington road.....	Sumner ave., southerly.		141		149.77	1.06	3.5	Sand
White st.....	Extension northerly to Lawrence st.		638		766.34	1.42	3.7	Sand
W. Whitrop st.....	Extension easterly to Dale st.	251 230	481		913.46	1.90	4.0	Sand
Wolcott st.....	Extension northerly		102		72.91	.71	4.5	Mari and loam
						6.5	3.5	Sand
Total,		1404 1293 3150 4243 6640 4409	21,139		\$27,238.19			

\$Does not include cost of connections to buildings or street inlets.

*131' of 6" underdrain and 481' of 4" underdrain.

*340' of 4" underdrain.

*143' of 4" underdrain.

*289' of 4" underdrain.

*293' of 4" underdrain.

*1366' of 4" underdrain.

*170' of 4" underdrain.

*320' of 4" underdrain.

*213' of 4" underdrain.

*1,234' of 4" underdrain.

*Completed.

*Incomplete.

Rein.

***COST OF SEWER SYSTEM TO DECEMBER 1, 1910.**

YEARS.	CONSTRUCTION.	MAINTENANCE.	TOTAL.
1863-1880 inclusive	\$357,163 72	\$38,178 38	\$395,342 10
1881	43,902 05	2,359 29	46,261 34
1882	28,391 33	3,039 25	31,430 58
1883	26,573 85	4,039 33	30,613 18
1884	36,035 22	2,929 25	38,964 47
1885	29,199 74	2,477 23	31,676 97
1886	25,313 73	2,541 81	27,855 54
1887	33,967 31	2,376 47	36,343 78
1888	30,872 07	3,951 21	34,823 28
1889	24,123 28	6,056 46	30,179 74
1890	20,722 72	10,004 42	30,727 14
1891	25,568 51	6,412 75	31,981 26
1892	27,331 84	6,823 51	34,205 35
1893	25,743 24	8,553 66	34,296 90
1894	27,142 69	7,236 53	34,379 22
1895	23,905 82	7,598 31	31,504 13
1896	45,299 89	8,634 30	53,934 19
1897	33,976 14	8,790 00	42,766 14
1898	47,751 26	6,986 99	54,738 25
1899	51,246 07	8,594 56	59,840 63
1900	140,330 89	9,862 21	150,243 10
1901	80,276 02	13,272 25	93,548 27
1902	38,904 19	12,909 40	51,813 59
1903	29,169 75	9,034 88	38,204 63
1904	46,339 05	12,916 69	59,255 74
1905	40,831 47	9,620 62	50,452 09
1906	24,419 73	12,444 00	36,863 73
1907	47,977 73	10,797 97	58,775 70
1908	62,949 97	10,468 88	73,418 85
1909	39,013 60	11,002 42	50,016 02
1910	43,909 33	13,196 60	57,105 93
	\$1,558,452 21	\$273,109 63	\$1,831,561 84

*Does not include cost of connections to buildings or street inlets.

*PRECIPITATION FOR CALENDAR YEAR—1910.

Month.	Total in Inches.	Greatest Amt. in 24 Hours.	Dates.	Portion of Storms in which the Precipitation exceeded Half Inch per Hour.	Max. Rate per Hour— Inches.	Duration of Max. Rate— Minutes.
Jan.	4.37	1.82	21-22	Feb. 21, .19 inch in 20 min.	.57	20
Feb.	3.76	.94	17-18	Mar. 7, .35 " " 25 "	.84	25
March	.90	.57	7	April 18, .13 " " 10 "	.78	10
April	3.25	1.77	26	June 16, .13 " " 10 "	.78	10
May	2.21	.78	30-31	" 18, .15 " " 12 "	.75	12
June	3.06	.81	5-6	July 13, .13 " " 10 "	.78	10
July	2.07	1.02	30	" 28, .12 " " 4 "	1.80	4
Aug.	3.20	1.46	10-11	" 30, .74 " " 19 "	3.53	8½
Sept.	3.42	.83	5-6	Aug. 4, .50 " " 28 "	1.07	28
Oct.	.66	.23	22	Sept. 1, .13 " " 13 "	.60	13
Nov.	3.49	1.11	3-4	" 6, .45 " " 30 "	.90	30
Dec.	1.79	1.36	24	" 21, .09 " " 6 "	.90	6
Total	32.18					

*Includes rain, melted hail, sleet and snow.

Number of days in which precipitation exceeded .01 inch,	99 days
Number of days during which snow and sleet fell,	25 days
Date of last snowfall in spring,	Feb. 23
Date of first snowfall in fall,	Nov. 8
Highest water in Connecticut river and date,	Jan. 23, 15.0'
Lowest water in Connecticut river and date,	July 18, 29, 3.0'
Annual range of Connecticut river,	12.0'
Mean daily height of Connecticut river,	5.4'
Greatest 24-hour rise and date,	Jan. 23, 7.2'
Greatest 24-hour fall and date,	Jan. 24, 3.8'

PRECIPITATION—1892-1910.

YEAR.	TOTAL IN INCHES.	YEAR.	TOTAL IN INCHES.
1892.....	37.70	1901.....	52.34
1893.....	39.72	1902.....	46.74
1894.....	27.43	1903.....	43.91
1895.....	36.66	1904.....	39.12
1896.....	36.33	1905.....	32.83
1897.....	53.25	1906.....	42.37
1898.....	49.18	1907.....	44.11
1899.....	34.78	1908.....	36.08
1900.....	43.62	1909.....	34.98
		1910.....	32.18
		Total.....	763.33

40.18 yearly average for 19 years.

GENERAL STATISTICS.**CITY OF SPRINGFIELD, MASS., DECEMBER 1, 1910.**

Springfield is situated on the east bank of the Connecticut river, in latitude 42° 06' north, longitude 72° 35' west, at an elevation above sea level of from 65 to over 215 feet.

Zero of "City Base" is 27.1 feet below sea level.

State street, at corner of Main street, is 65.9 feet above sea level, or 93 feet "City Base."

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner avenue, at corner of Belmont avenue, is 187.9 feet above sea level.

Population, census of 1910,	88,926
Number of voters: men, 14,823; women, 307; total,	15,130
Number of polls, April 1, 1910,	25,379

School enrollment:	public, day, 15,576	18,277	}	20,234
	public, night, 2,701			
	parochial, 1,957			

Greatest extent of city, north and south, 5.9 miles

Greatest extent of city, east and west, 8.9 miles

Connecticut river frontage, 4.65 miles

Area, including those portions covered by water, approximately, 24,661 acres

Area by wards: Ward One, 1,733.6 acres; Two, 225.7 acres; Three, 234.8 acres; Four, 413.2 acres; Five, 400.6 acres; Six, 327.4 acres; Seven, 2,197.7 acres; Eight, 19,128.3 acres.

Total park areas, 521.07 acres; Forest Park, 476.10 acres.

Area taxed, 16,185 acres; tax rate, \$15.80 per \$1,000.

Valuation, (Real estate,	\$94,984,660	\$119,081,778
April 1, 1910. (Personal,	24,097,118	

		Square yards.	Miles.
Public streets accepted) 159.138 to Dec. 1, 1910, } miles.	Wood block,	52,891	2.039
	Granite block,	36,716	2.140
	*Syracuse brick,	77,920	3.700
	Other brick pavers,	8,220	.753
	Sheet asphalt,	7,877	.444
	Asphalt blocks,	712	.037
	Bitulithic,	43,531	2.335
	†Macadam,	1,281,163	70.772
	Gravel or dirt,		76.918
			159.138

Sidewalks laid in public streets to Dec. 1, 1910, about 170.25 miles.

*Does not include brick pavement in railway tracks around Court Square.

†Includes Pecousic avenue and Longmeadow street through Forest Park under the care of the Park Department.

Electric railways, Jan. 1, 1911 (double track counted twice),			
In public streets,	.	.	50.794 miles
On private property,	.	.	3.761 miles
			54.555 miles
Steam railroads,	{	Four tracks, about	4.5 miles
		Double tracks, about	7. miles
		Single track, about	11. miles
Water mains,	.	.	182.74 miles
Gas mains, July 1, 1910,	.	.	138.40 miles
Sewers, 122.436 miles,	{	Brick sewers,	26.070 miles
		Vitrified clay pipe,	68.178 miles
		Cement pipe,	24.013 miles
		Brick, stone and plank,	.174 miles
		Wood pipe,	.193 miles
		Cast iron,	.028 miles
		Concrete,	3.655 miles
		Brick-concrete,	.125 miles
Street lights, arc,	1,182	Post offices,	4
Street lights, incandescent,	211	Post office sub-stations,	17
Dwelling houses,	13,923	Police stations,	2
Schoolhouses,	36	Railroad stations,	5
Churches,	60	Engine houses,	13
Steam fire engines,	8	Hose and chemical automobiles,	2
Chemical engines,	2	Electric aerial truck,	1
Hose wagons,	10	Auxiliary squad automobiles,	2
Ladder trucks,	4	Spare auxiliary automobile,	1
Aerial trucks,	2	Automobiles for Chief, Assistants,	
Water towers,	1	and Supt. Fire Alarm,	5
Trolley transportation car,	1	Commercial truck,	1

PRINCIPAL CITY EXPENDITURES.

Assessors' department,	.	.	.	\$13,207.25
Board of Health,	.	.	\$13,484.41	
Board of Health, Isolation Hospital,	.	14,717.91		37,679.40
Board of Health, Isolation Hospital addition,	.	9,477.08		
City Engineering department,	.	.	.	12,327.68
City Library Association,	.	.	.	47,059.70

Collector's department,			\$10,071.40
Commissioners of the sinking funds,			102,454.47
Contingencies,			48,094.44
County tax,			95,413.62
Fire department,		206,406.21	
Fire department, new buildings,		59,988.18	266,394.39
Fire and Police headquarters,			85,176.27
Forestry,		15,825.02	
Forestry, new buildings,		3,409.08	19,234.10
	Maintenance,	136,890.28	
	Bridges,	10,476.51	
	Paving,	30,693.06	
	Macadam and gravel,	45,298.18	
Highways and Bridges,	Walks and Curbing,	12,096.99	
	Special accounts,	\$3,445.70	
	Special, North street ext.,	149,101.18	488,599.29
	Ashes collection,	42,161.24	
	Garbage collection,	20,451.88	
	Watering streets,	37,984.27	
Interest,			214,560.22
Lighting streets,			96,908.49
Municipal group,			176,835.88
Pauper department,			55,451.80
Police and Watch,		140,619.93	
Police headquarters,		631.43	141,251.36
Public parks,			50,489.16
Schools,		587,650.76	
Schools, new buildings, etc.,		57,732.71	645,383.47
Sewers,			57,105.93
State Treasurer, taxes,			187,835.25
Water Works, cash expenses,		263,828.88	
Water Works, Little river water supply,		306,615.45	570,444.33
			<u>\$3,421,977.92</u>

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Report of

★ City Engineer

Springfield
Mass.



For the Year 1911



Report of

City Engineer

City of Springfield
Massachusetts

1911

REPORT OF THE CITY ENGINEER.

CITY OF SPRINGFIELD, MASS., December 28, 1911.

To the City Council:—

In accordance with the provisions of the City Ordinances, the annual report of the Engineering Department for the year 1911 is respectfully submitted, with a statement of receipts and expenditures and a general description of the more important work, also such suggestions as have been considered in order.

FINANCIAL STATEMENT.

RECEIPTS.

Annual appropriation for the year 1911,.....	\$10,721 00
Receipts from other city departments,.....	2,569 21
	<hr/> \$13,290 21

EXPENDITURES.

Salaries of City Engineer and assistants,.....	\$11,494 80
Office rent and lighting,.....	572 96
Drawing materials, stationery and general supplies,	536 95
Car fares, automobile service and sundry office expenses,	645 25
	<hr/> 13,249 96
Balance unexpended,.....	<hr/> \$40 25

DESCRIPTION OF EXPENDITURES FOR SALARIES.**ENGINEERING DEPARTMENT.**

For all services performed on account of matters referred to the Board of Public Works by the City Council relating to the laying out or alteration of streets, sidewalks, sewers, and parks; for surveys and levels, plans and profiles, estimates of cost, releases from damages, reports to the City Council, and general correspondence and interviews relating to matters referred to the Board, and all clerical work performed relating to public hearings and all meetings of the Board; measuring and assigning house numbers, work upon house number books and records; furnishing street lines and grades to individuals for buildings, grading, fencing, and sidewalk construction; surveys, estimates, and all general services performed for the various committees of the City Council; general map, plan, and profile drawing of streets, sewers, and public property for office records and for future reference; measuring and recording all sewer connections for house drains, and furnishing lines and grades for same; preparation of plans and photographs for the City Solicitor's use; indexing plans and other office records; photographing and blue printing, examination of deed records, setting of street monuments, and all other services not charged to other city departments, the sum of **\$8,925.59**

HIGHWAY DEPARTMENT.

For all services performed on account of and charged to the street work appropriation; estimates and plans, lines and grades for paving, macadam and gravel, final measurements, inspection of new paving and repairs, and bridge repairs and maintenance, general study and report for new type of flooring for South End bridge, and all other incidental work, the sum of **\$574.85**

SIDEWALKS AND CURBING.

For all services performed for the general sidewalk and curbing appropriation; lines and grades for laying out and inspection of construction, measurements for assessments, and all work incidental thereto, the sum of **\$481.23**

ASHES COLLECTION.

Grades at West Street Dump, the sum of **\$9.52**

WATERING STREETS.

Measuring streets and private ways, the sum of **\$5.80**

LOCUST STREET LAYOUT.

Construction surveys, designs for retaining wall masonry and culverts; staking out lines and grades, general supervision and direction, and all incidental work, the sum of **\$516.41**

NORTH STREET EXTENSION.

Lines and grades for grading and macadamizing, the sum of **\$18.14**

PECOUSIC AVENUE—RELOCATION AND IMPROVEMENTS.

Grades for resetting curbing at the corner of Gardner street, the sum of **\$1.38**

SEWER DEPARTMENT.

For all services performed on account of the general sewer appropriation; plans, estimates, laying out of work and general supervision of construction details, and all other incidental work, the sum of **\$495.71**

ASSESSORS' DEPARTMENT.

Surveys and plans, computations of areas and dimensions for plans of private property, examination of deed records, and corrections of old plans, the sum of **\$397.61**

*City Engineer's Report.***WATER DEPARTMENT.**

Street lines for laying new mains (part in 1910) and grades for resetting curbing, the sum of \$11.33

FORESTRY DEPARTMENT.

Staking out new buildings on Pecousic avenue, the sum of \$2.68

LIGHTING STREETS.

Plan and blue print of electric light poles, the sum of \$3.60

FIRE DEPARTMENT.

Survey of Pine street lot, plan of Patton street lot, and setting stone monument on Court street, the sum of \$6.44

FIRE AND POLICE HEADQUARTERS.

Plan of Dwight street lot for architect (made in 1910), the sum of \$5.06

RIVER FRONT.

Plans showing proposed development from Elm to Cypress street in connection with proposed new railroad station, the sum of \$18.15

CHARTER REVISION.

Diagrams illustrating City Government official subdivisions, the sum of \$9.00

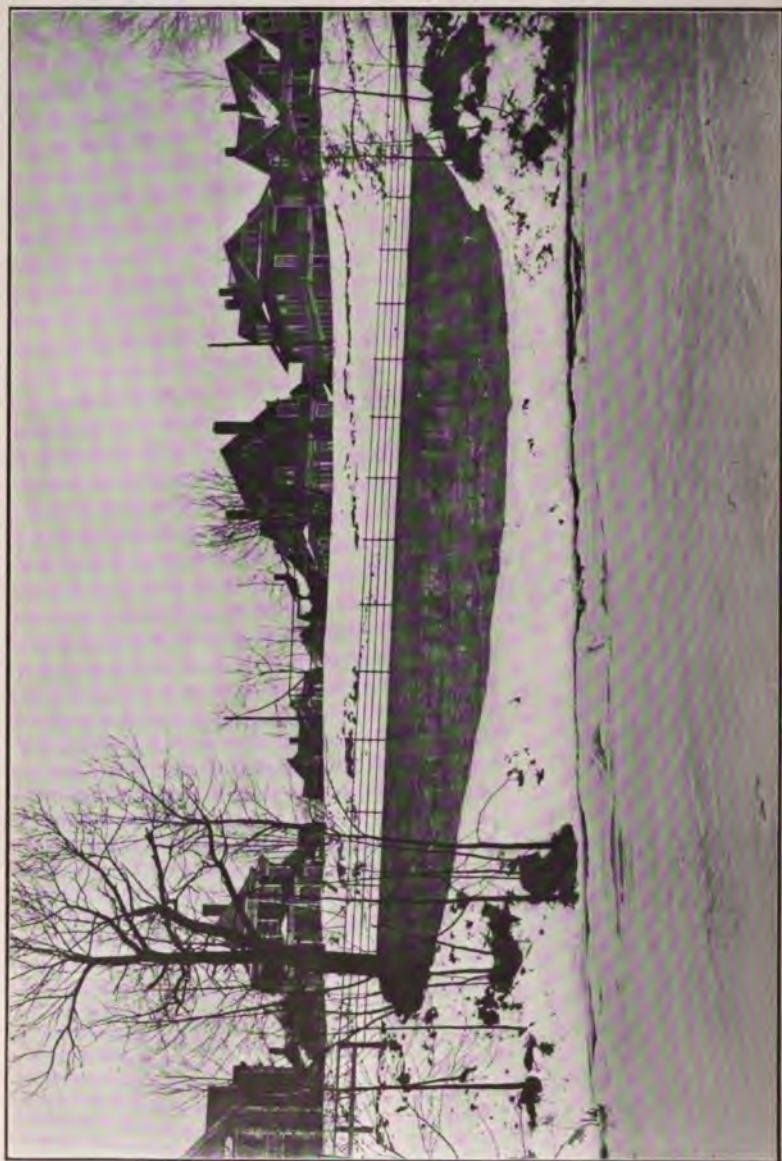
COMMONWEALTH OF MASSACHUSETTS—DEPARTMENT OF WEIGHTS AND MEASURES.

Measuring courses for taxicab testing, the sum of \$8.50

A. E. STEPHENS COMPANY.

Lines for heating plant, the sum of \$3.60





CONCRETE RETAINING WALL.
LOCUST STREET EXTENSION

THE WORK OF THE YEAR.

The Engineering Department has responded to the usual requests from the various other city departments, committees and officials in the usual manner, the work performed consisting in the main of the regular routine duties prescribed by city ordinance.

The character of the work has been of the more usual order, with occasional calls for special studies.

SERVICE FOR DEPARTMENTS.

HIGHWAYS AND BRIDGES.

The calls for service for this department have been met in the regular way, and about the usual time expended in the work of new paving, sidewalk, and curb construction, and the alteration and new construction relating to bridges.

PAVING.

The usual policy has been followed concerning the kind of materials used for permanent paving, and no radical departure has been made from the materials heretofore used.

BITULITHIC.

A total of 9,886 square yards of bitulithic paving has been laid under contract with the Warren Brothers Company. All of this work was laid on a five-inch concrete base of Portland cement concrete and under a five-year guaranty.

The former practice of laying this kind of paving on a bituminous base was some time ago discontinued, the advantage of the cement base over the other kind being generally recognized.

The general satisfaction resulting from the bitulithic pavement continues, being recognized as one of the standard paving

materials for residential and business streets not subject to too heavy traffic.

A considerable amount of repairs to the bitulithic pavement has been made during the year amounting to 8,844 square yards. A considerable part of these repairs was due to cutting into the pavement for the varied work underground, the balance of repairs being due to the ordinary wear and tear of general use; 8,706 square yards repaired were due to openings for underground work, and 138 square yards to ordinary wear and maintenance.

The cost of the latter for an area of 43,531 square yards, the total amount laid to 1911, amounts to \$0.003 per sq. yd. per annum.

SHEET ASPHALT.

No new sheet asphalt has been laid for several years; 635 sq. yds. were repaired during the year due to ordinary wear and tear. The cost of the latter represents \$0.187 per sq. yd. per annum.

The guaranty period for all sheet asphalt pavement having expired, the cost of repairs is now borne by the city.

CREOSOTED WOOD BLOCKS.

The wood block paving in North Main street and in State street has been extended to cover an area 6,340 square yards.

The regular practice for the last ten years was followed, and long leaf yellow pine blocks treated with a compound of creosote oil and pitch were again used. All work of this kind was laid on a five-inch Portland cement concrete base, and the joints filled with cement grout.

The blocks were purchased of the United States Wood Preserving Company and the work of laying the entire pavement performed by the Street Department with the usual co-operation of the Engineering Department. This form of pavement, regarded by some experts as more or less of a luxury

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CONCRETE STEEL BRIDGE OVER MILL RIVER
LOCUST STREET EXTENSION

in view of attending cost, is still regarded by the public and business interests as the most satisfactory material heretofore used in this city, possessing reasonable durability and general good qualities.

WOOD BLOCK REPAIRS.

The first entire replacement of wood block paving, due to ordinary wear, was made during the year; the blocks in the section of Main street covered by the Boston & Albany Railroad arch, and approaches thereto, laid in 1900, having been replaced for several feet outside the rails of the street car tracks, where the wear was greatest.

These blocks as first laid were grooved at all transverse joints, which resulted in a more rapid rate of wear than would have been the case with ordinary blocks.

The blocks used for relaying were furnished by the United States Wood Preserving Company without cost to the city according to the terms of original guaranty.

A tabulated statement will be found at the end of report showing amount, cost, and other details for all paving work of the year as well as the work done in former years.

SPECIAL STREET WORK.

The new thoroughfare south of Mill River connecting Belmont avenue and Dickinson street in extension of Locust street, and known as the "Locust Street Extension," is now nearly completed.

The preliminary considerations extending over several years terminated in December, 1910, in a favorable recommendation from the Board of Public Works to the City Council, who passed an order for the taking and layout. Early in the present year the necessary moneys were provided and the City Engineer instructed to proceed with the advertisement and letting of the work.

Contracts were awarded to T. J. Hines & Son for the work of extending the arch bridge over Mill River; the general work of grading, retaining wall construction, culverts, and railings was let to the firm of F. T. Ley & Company,—all work being under the general direction of the City Engineer.

The bridge construction, a concrete-steel structure of the National Bridge Company's patented design, was successfully completed in the early fall season, and the finished structure reflects credit upon the designers, represented locally by Mr. Walter N. Denman, consulting engineer, and the contractors for the work.

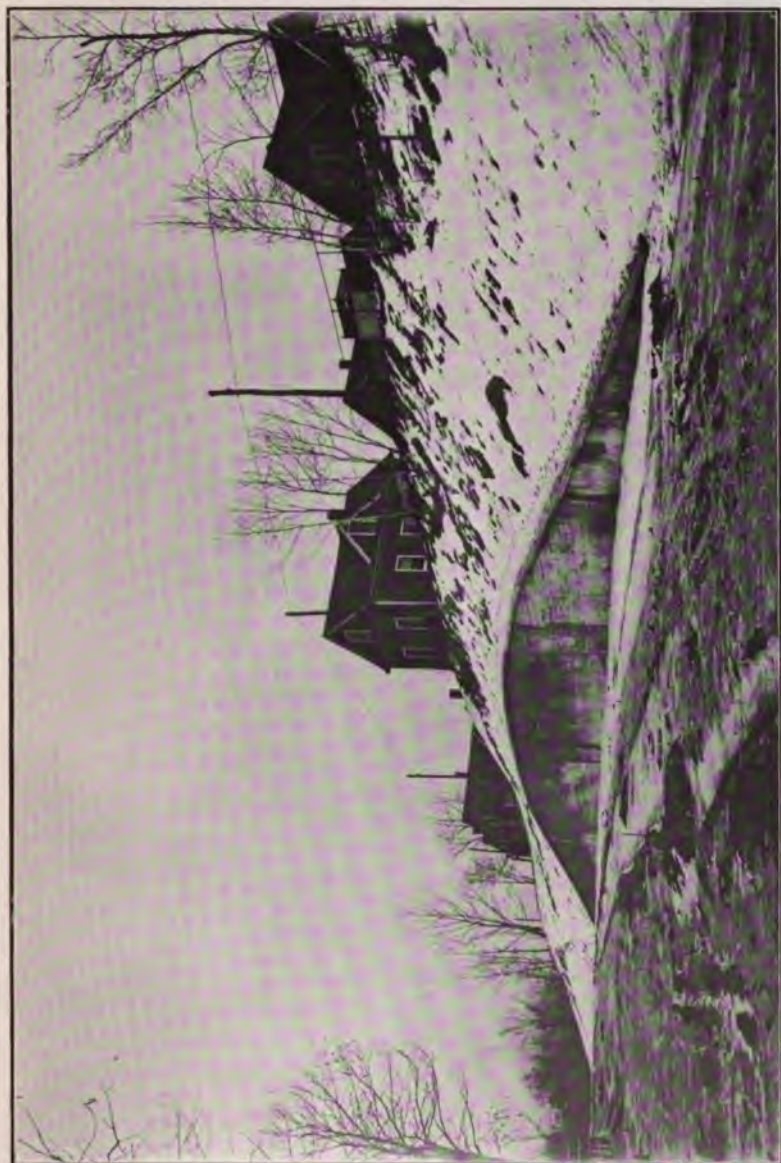
The cost of the bridge structure, an arch of twenty feet span with ornamental railing, was \$3,789.

The contractors for the grading having a very extended experience in nearly all lines of construction work, and ample facilities for the same, promptly began operations about August first and prosecuted the work with diligence and vigor, employing a steam shovel for excavating, which was of special value in the deep cut consisting in the main of a tenacious red hardpan gravel, requiring the use of explosives to loosen the same.

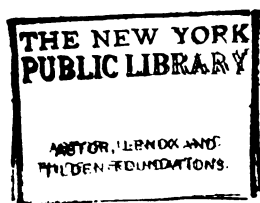
The completion of this work opens a new thoroughfare of travel leading into the heart of the southeasterly section of the city.

The Springfield Street Railway Company was granted a franchise, for a track location through the new thoroughfare, during the year; a special reservation twenty-one feet wide on the northerly side having been made for the track location. It is expected that the company will carry out the work of track construction early the coming season, extending through Dickinson street to Sumner avenue, passing through a large and rapidly growing section having heretofore no adequate accommodation for street car travel.

The cost of the grading and other work performed by F. T. Ley & Company will amount to about \$20,000, when finished.



CONCRETE RETAINING WALL IN DEEP CUT
LOCUST STREET EXTENSION



ST. JAMES CIRCLE.

St. James circle has been laid out and established, also graded, and a suitable roadway macadamized to meet the pressing demands for a better communication with the city for the important manufacturing enterprises located east of St. James avenue.

NEW STREET LAYOUTS. RELOCATIONS AND WIDENINGS.

Orders have passed the City Council under recommendation of the Board of Public Works for ten new streets accepted as public, aggregating in length 7,550 lineal feet or 1.429 miles.

In addition to the above, five streets have been relocated or widened.

A tabulated statement is annexed to this report showing lengths, widths, and location of streets included in the above.

BIRNIE AVENUE EXTENSION.

The extension of Birnie avenue from Arch to Plainfield street was secured by vote of the City Council passed on recommendation of the Board of Public Works in September of the present year, and the lands to be acquired from individuals and the railroad corporation are being secured by the law department. It would appear that another season should provide for the construction of this connecting link for north and south travel in view of its unusual importance to the traveling public.

The Board of Public Works have labored long to find some feasible scheme for a location over and around the northerly end of Round Hill that would meet the approval of adjoining real estate interests.

When completed this connection will provide another important through thoroughfare connecting Fulton street and Birnie avenue of great benefit to commercial and manufacturing interests.

The construction involves unusual expense for retaining wall masonry and grading, being located on a steep sidehill, occupying a considerable part of the location of the Boston and Maine Railroad.

SIDEWALK CONSTRUCTION.

There has been about the usual amount of sidewalk construction during the year, the same kind of materials heretofore employed having been used in the work.

The Board of Public Works recognizing the good qualities of Portland cement concrete, as laid in the city for many years, have decided that in view of economy and the public convenience, the cement concrete material should be generally employed for all business streets; the Board consider the material also well adapted to the residential streets.

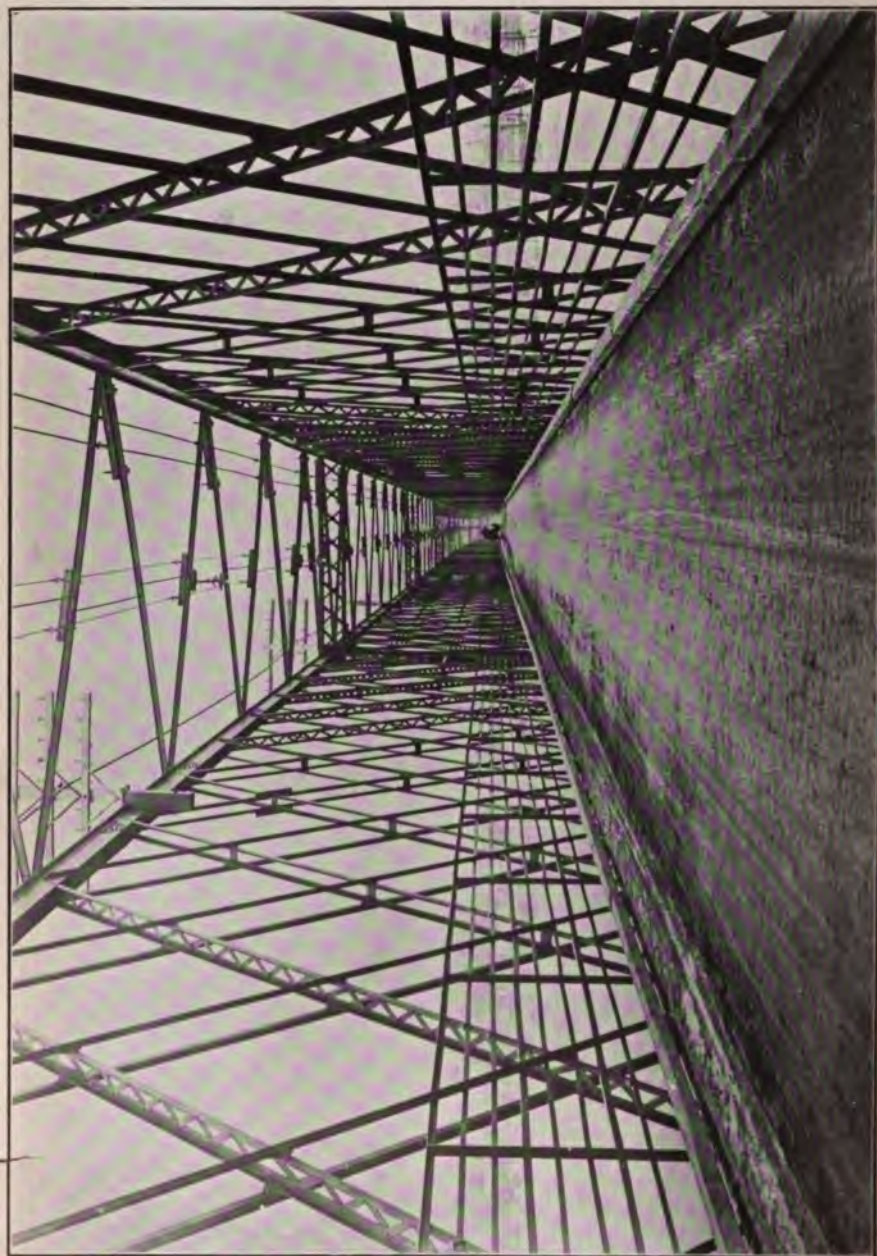
The sidewalks of bituminous materials have not shown the durability of the Portland cement and their cost during recent years has been nearly as great.

The question frequently arises as to the expediency of placing the duty of constructing sidewalks upon the owners of abutting real estate as has been the custom in our city for many years. It has been found from time to time that much dissatisfaction results from this practice; although the reports of the Board of Public Works contain a general specification of the methods and materials to be employed, frequently they are not fully followed or observed; the result is unsatisfactory to the pedestrian and the burden of cost of maintenance, which also falls wholly on the abutter, is increased. At present there is no supervision or inspection of the sidewalk work performed by abutters; the work is undertaken without knowledge of the city authorities as to time and place.

It is also found that the established grades as laid out by the Engineering Department for sidewalk work are not fully observed in all cases, which results in further dissatisfaction.

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NEW CREOSOTED PINE FLOORING, UNDER FLOOR AND PAVING BLOCKS
SOUTH END BRIDGE

At the expiration of the time allowed abutters by the City Council's order for completion of sidewalk work, the city is authorized to complete the work by days' labor or by contract.

The work done in completion of sidewalks as undertaken by the Street Department, with its trained foremen and workmen, results in a better quality of work and a proper regard for correct lines and grade. The work done under contract is placed under the direction of the City Engineer and his inspectors. Most of the work performed during the year on sidewalks and curbing of cement concrete was so carried out under contract, and with uniformly satisfactory results.

It is believed that with a view to best results the city should carry out all sidewalk and curb work, under its direct management and control, and that there is no more reason for requiring individual property owners to engage in sidewalk and curb construction, than in the work of constructing and repairing roadways.

BRIDGE MAINTENANCE.

The care and maintenance of the bridges over the Connecticut River, owing to their considerable length, about one quarter of a mile each, involve at intervals considerable time and consideration. The South End bridge floor system was examined early in the summer season and it was found that the Kyanized spruce under-flooring, floor joists, and under-floor, as laid in 1893, were so unsound that immediate steps should be taken looking to removal of the entire flooring. The wearing surface of two-inch untreated spruce was also so worn that its removal was necessary.

The City Engineer was requested to examine into the general question of the best method and material to be used, as well as the cost of replacement.

An extended inquiry and study were made concerning the many methods now in use for the treatment for preservation of timber, which resulted in a general recommendation for the

employment of creosoted short leaf yellow pine for all timber; the under-flooring as finally used consisted of $2\frac{3}{4}$ inch yellow pine laid on floor joists of same material.

The wearing surface consists of creosoted short leaf yellow pine paving blocks, $2\frac{3}{4}$ inches in depth. The blocks were laid directly on the under-flooring, which was laid close, and the joints filled with a bituminous joint filler, and a thin coating of trap rock screenings spread on top while the bitumen was warm so as to unite with it.

The flooring as relaid presents a uniform surface convenient for passing vehicles, and it is believed that the best results have been secured for economy and satisfactory use, although the cost was considerable more than would have resulted from the use of ordinary flooring of untreated timber.

It is believed that the creosoting process will serve to preserve the timber for twenty-five or thirty years without appreciable decay, and the wearing surface, when badly worn, can be renewed without removal of the under-flooring.

The North End bridge over Connecticut River has become so rough that the two-inch wearing surface of ordinary spruce is to be renewed. A contract has been made with the Blodgett Lumber Company for the lumber, which is looked for at an early day.

ABBE AVENUE CROSSING BRIDGE.

The steel structure over the Boston and Maine Railroad at Abbe avenue is in need of painting and the thorough cleaning of all steel work and painting should be provided for the coming year.

SEWER WORK.

The season's sewer work has covered about the usual amount of vitrified pipe and cement concrete sewers, with a rather larger proportion of pipe sewers than usual.

In all 20,623 lineal feet of sewers have been laid, 19,241

lineal feet of which were vitrified pipe, and the balance of 1,382 lineal feet, Portland cement concrete. A tabular statement of details is attached to this report.

As in former years the practice has been continued of using cement concrete for all sewers larger than a twenty-four inch circle.

The all-around good results obtained by the use of Portland cement concrete in former years as well as a very considerable saving of cost has led to further use.

All work of the year has been performed by the Sewer Department by days' labor, with the co-operation of the Engineering Department.

CEMENT PIPE SEWERS.

At the beginning of the year 1911, there were 24 miles of cement pipe sewers in use, laid prior to 1890, at which time the laying of cement pipe was discontinued.

For many years the cement pipe sewers have been disintegrating to such extent that the only practicable way out of the difficulty has been to replace them with vitrified clay pipe. During the year 8,101 lineal feet of cement pipe sewers, representing a first cost of about \$9,500, have been abandoned and replaced with vitrified clay.

BOARD OF PUBLIC WORKS.

The requests of the Board of Public Works acting in their advisory capacity upon the various petitions referred to them by the City Council, pertaining to streets, sidewalks, sewers, and parkways, have been met in the usual way, where studies, plans, surveys, and estimates were necessary.

The City Engineer, acting as clerk for the Board, has attended all hearings and office meetings of the Board, amounting in all to 89 in number.

WATER STREET WIDENING.

One of the more important matters coming under the consideration of the Board was the widening of Water street on the westerly side from Gardner street to Whitney avenue, the measure being now before the City Council body for final action, the street to be widened from 49½ to 80 feet. If carried out the widening will form a continuation northerly of Pecousic avenue layout, which is 100 feet wide.

SEWER STUDIES.

The matter of extending the Mill River valley intercepting sewer northeasterly through the valley of Carlisle Brook to the vicinity of the Wilbraham road, is now under consideration and study. Some buildings have been erected in the vicinity of Marlborough street, that cannot be satisfactorily reached by the lateral sewers connecting with the trunk line in the Wilbraham road westerly from Carlisle Brook valley.

The extension of the Mill River valley intercepting sewer will meet the necessities of this locality.

The extension of the intercepting sewer through Hickory street around the northerly shore of Watershop pond to the vicinity of Wilbraham road is also under consideration by the Board to which a petition for this sewer has been referred.

EAST SPRINGFIELD SEWER SYSTEM.

A petition was referred to the Board in the summer of 1910 for a sewer in Highland terrace in East Springfield, so-called. After a hearing and view of the ground it was found that there was no sewer in the locality that could be used as an outlet. Further investigation and study showed that the only available trunk sewer of the present system of city sewers was the Garden Brook sewer ending at Armory street near the Boston and Albany Railroad crossing. The general study showed

that an extension of the Garden Brook sewer through Albany street to the foot of the bluff, thence across the Boston and Albany Railroad to and through Chicopee road, and through Jennett avenue and private property to Highland terrace, would be required to meet the desires of the petitioners. This extension would necessitate the construction of 9,300 lineal feet of sewer or $1\frac{3}{4}$ miles, which would reach to Highland terrace, but would not provide a sewer through the same.

The Board found that no buildings had been erected in the locality, and as the estimated cost of the sewer to reach Highland terrace was about \$65,000 the Board did not deem it expedient that the sewer should be recommended; they therefore reported to the City Council that the petitioners should have leave to withdraw. Subsequently another petition was presented for the drainage of the section lying easterly of Highland terrace extending easterly to Poor Brook; this involved the consideration of another system whose natural outlet was northeasterly through the Poor Brook valley to Chicopee River in the opposite direction from the city.

The Board was asked by the Finance Committee, to whom the matter was referred, to inform the committee of the feasibility of draining into Chicopee River, as proposed by the proprietors of the land in the locality.

The Board counseled with the State Board of Health, which advised adversely as to the use of Chicopee River as an outlet.

The report of the State Board was referred by the Board of Public Works to the City Council, with a supplementary report repeating in general their first recommendation.

DWIGHT AND CHESTNUT STREETS.

The extension and widening of Dwight and Chestnut streets is now under consideration by the Board, which have found that these two projects involve unusual study and time, for the determination of a rational finding.

The routes are being carefully considered and a great amount of detail must be studied in order that the public convenience may be best served, in the final decision upon these matters.

ASSESSORS' PLANS.

There has been less than the usual amount expended during the year for plans for the use of the Assessors of Taxes. All plans have been made to conform to former work, and several sheets of the usual size have been prepared.

Tracings of all plans have been made for use in the City Engineer's office.

The total expenditure amounts to \$397.61. Thirty-five new plans have been made of uniform size of 20 by 26 inches, on mounted white drawing paper.

The plans for the business and residential sections of the city having been made in former years, there remains but the suburban and farming districts.

The work should be continued from year to year as rapidly as appropriations will permit until the entire city has been covered.

Considerable work is required each year to correct plans previously made, to show changes in ownership, and different subdivisions of property.

As the number of plans increase, this work of correcting plans previously made each year will be considerably increased.

TABULAR INFORMATION.

The usual tabular statements of details pertaining to the several classifications of work with which the department has been associated will appear with this report when printed.

DEPARTMENT EMPLOYEES.

The usual force of assistants has been employed during

the year, with some extra service during a portion of the summer. Assistant Engineer Mr. Herbert E. Flint, as in former years, has directed the detail of the work and the office force. Assistants Mr. Edward G. Martin, Mr. Charles A. L. Wright, Mr. Ernest F. Young, Mr. Charles J. Hancock, Mr. Edward W. Burnett, Mr. Rowland W. Greenwood, and Mr. Irving P. Salisbury have made up the regular office force. There have also been employed during a portion of the year, Mr. Robert A. Palmer, Mr. Charles D. Todd, Mr. Ernest T. Reilly, and Mr. George W. Schwenger.

Miss Alice M. Hancock has performed the usual duties of stenographer, typewriter, and general office clerk.

In closing I desire to thank the assistants for their co-operation in the work and the various city officials for the pleasant relations sustained and the courtesies extended.

Respectfully submitted,

CHAS. M. SLOCUM,

City Engineer.

City Engineer's Report.

BOARD OF ALDERMEN, Dec. 28, 1911.

Read, accepted, ordered printed, and sent down for concurrence.

E. A. NEWELL, *Clerk.*

COMMON COUNCIL, December 28, 1911.

Read and concurred.

GEO. J. CLARK, *Clerk.*

Presented to the Mayor for approval, December 29, 1911.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, SPRINGFIELD, MASS., December 29, 1911.

Approved.

EDWARD H. LATHROP, *Mayor.*

WORK ITEMIZED.

BRIDGES.

REPAIRS AND CARE.

	Description of Work.	Cost.
Abbe avenue overhead crossing,	General and railing repairs,	\$54 63
Armory street over B. & A. Railroad,	Floor repairs,	153 36
Armory street over N. Y., N. H., & H. Railroad,	Floor repairs,	117 39
Berkshire street, Red House crossing,	Floor repairs,	97 43
Main street, I. O.,	Floor repairs,	53 23
North end, over Conn. River,	Floor repairs and cleaning,	885 84
Old Toll,	Floor repairs and care,	472 16
Plainfield street,	Floor repairs,	257 54
South end, over Conn. River, and N. Y., N. H., & H. Railroad,	Floor repairs,	378 73
St. James avenue,	Floor repairs,	345 09
Sundry,	Small repairs,	23 23
		<hr/> \$2,838 63

STREET CONSTRUCTION.
GRADING AND GRAVELING.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Kensington avenue, Pecousic avenue, Sumner avenue, Wellington street, Willmont street,	Oakland street easterly, just north of Mill River (grading), just east of railroad (grading), Wilbraham road southerly, Ranney street westerly,	1,200 690 200	4,000 2,300 787	\$0 04 06 11	\$154 82 388 06 281 57 145 87 88 38
		2,090	7,037		\$958 70

STREET CONSTRUCTION.

MACADAM.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Alfred street,		490	1,685	\$0 47	\$767 09
Berkeley street,		458	1,510	537	810 83
Bowdoin street,	Worthington street to Ingersoll grove,	792	2,940	536	1,414 46
Buckingham place,		275	916	585	585 76
Buckingham street,		2,006	6,678	53	3,543 16
Cherryvale avenue,		687	2,290	607	1,390 72
Chestnut street,	west side Jefferson avenue to Springfield street,	1,665	3,250	784	2,547 17
Cumberland street,	grading for macadam,				161 05
Florentine gardens,		706	3,501	547	1,914 27
Florida street,	Worthington street to Ingersoll grove,	785	2,202	518	1,140 67
Ingersoll grove,	Worthington street to Bowdoin street,	1,395	4,650	50	2,320 98
Magnolia terrace,	Spruceland street to Pineywoods avenue,	556	3,089	50	1,546 39
Marengo park		1,869	6,230	498	3,105 37
Mounmouth street,		1,168	4,000	498	1,991 16
Montmoreuci street,		620	2,067	448	926 66
Mulberry street,	School to Union street,	1,322	3,223	506	1,630 17
North street,	Carew to Liberty, completion of work of 1910,				558 21

STREET CONSTRUCTION.

MACADAM—CONTINUED.

Street	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Pineywoods avenue, Riverview street, Riverview terrace, St. James circle, Union street, Washington road, Westernview street, Westford avenue,	Washington road to Florentine gardens, St. James avenue to Jennette avenue, School to Mulberry, Sumner avenue to Pineywoods avenue, Wilbraham road to north curb line Gunn square,	1,273 625 281 1,131 938 800 650 1,380 21,867	4,243 2,094 721 1,509 3,128 2,667 2,167 6,133 70,543	\$0 507 62 64 633 37 47 547 44	\$2,149 48 1,300 61 461 81 954 80 1,165 67 1,256 46 1,185 45 2,696 24 \$37,464 64

. STREET MAINTENANCE.
MACADAM RESURFACING.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Boylston street, North Main street, State street,	Emery to Clinton, Wason avenue to Chicopee line (rebuilt), northerly side, City Library, easterly to Federal street,	303	748	\$0 56	\$418 88
		1,026	3,938	69	2,721 24
Walnut street, West street, Worthington street,	westerly side, Hancock street southerly, Spring to Kibbe avenue (completion 1910 work),	2,740	7,834	347	2,722 33
		300	400	37	147 84
		1,195	3,872	588	2,268 09
		5,564	16,792		1,465 89
					\$9,744 07

STREET MAINTENANCE.

GRAVEL RESURFACING.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Berkshire avenue,	State street to Red House crossing, northerly side,	7,600	10,248	\$0 155	\$1,589 28
		7,600	10,248	\$0 155	\$1,589 28

STREET CONSTRUCTION.

PAVING.

Street.	Limits.	Material.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Bridge street,	Completion of work of 1910,	Bitulithic,	252	895	\$2 568	\$1,968 41
Bridge street,	Dwight to Chestnut,					
*Court street,	Extension westerly to Water street, Court Square avenue to Water street,					
Liberty street,	Main street easterly,	Bitulithic,	617	2,699	2 69	7,274 57
North Main street,	Bancroft to Calhoun, com- pletion of work of 1910,	Bitulithic,	311	1,385	2 64	3,625 91
North Main street,	Calhoun to Grove,	Wood blocks, Bitulithic,	673	3,466	2 90	8,529 55
Pynchon street,	Main to Water,					
State street,	Pleasant to Terrence, com- pletion of work of 1910,	Wood blocks, Bitulithic,	639	3,256	3 30	10,754 41
State street,	Terrence to Westminster,					
Vernon street,	Main to Water,					
Walnut street,	at Ashley street,	Bitulithic,	821	2,047	2 58	5,278 28
		Bitulithic,	44	44	3 00	131 86
			4,183	16,608		\$57,882 98

*This work was allowed a special appropriation of \$7,000.49.

STREET MAINTENANCE.**PAVING RESURFACING.****BITULITHIC SKIM COATING.**

Street.	Area in sq. yds.	Cost.
Maple street,	1,710.69	\$1,283 02
Market street,	801.93	601 45
North Chestnut street,	813.30	609 98
North Main street,	1,066.64	799 98
State street,	594.10	445 57
Taylor street,	202.03	151 52
Walnut street,	1,526.02	1,144 51
Worthington street,	119.94	89 96
	6,834.65	\$5,125 99

ASPHALT REPAIRS.

Street.		Area in sq. yds.	Cost.
Bridge street,	Rock asphalt,	459.90	\$1,057 77
Court street,	Rock asphalt,	39.31	90 42
Elm street,	Rock asphalt,	43.71	100 53
Harrison avenue,	Trinidad asphalt,	88.20	202 86
Sanford street,	Rock asphalt,	3.94	9 06
		635.06	\$1,460 64

SIDEWALKS AND CURBING.

CONSTRUCTION AND RECONSTRUCTION.

By orders of the City Council.

Street.	Length in feet.	SIDEWALKS.		CURBING. Length in feet, 4"	Order Approved.
		Material.	Description.		
Abbe avenue,	820	Brick,	New,		Sept. 20, 1910.
Andrew street,	291	Tar concrete,	Skim coat,		Sept. 20, 1910.
Benton street,	1,000	Brick,	New,	2,061	July 13, 1911.
Boylston street,	585	Brick,	Relaid con- crete curb,		June 29, 1910.
Carew street,	470	Cement concrete,	New,	551	Nov. 15, 1910.
Cass street,	50	Brick,	New,		June 6, 1911.
Chestnut street,	115	Brick,	Relaid,		Nov. 23, 1910.
Dickinson street,				1,629	Sept. 20, 1910.
Foster street,	405	Brick,	New,	33	May 25, 1910.
Franklin street,	602	Brick,	New,		Sept. 27, 1910.
Hamburg street,	148	Tar concrete,	New,		June 29, 1910.
Hancock street,	225	Brick,	New,	752	July 12, 1910.
Hancock street,	138	Brick,	Relaid,		July 12, 1910.
Kensington avenue,			Concrete curb,	1,986	July 12, 1910.
Lester street,	250	Cement concrete,	New,		July 13, 1911.

SIDEWALKS AND CURBING—Continued.

Street.	SIDEWALKS.		CURBING.		Order Approved.
	Length in feet.	Material.	Description.	Length in feet, 4'' 6''	
Liberty street,	2,797	Brick,	Relaid, Granite, Concrete curb,	419 }	June 1, 1910.
North street extension,	1,929	Cement concrete,	New,	2,014 }	Sept. 2, 1910.
North street extension,	941	Cement concrete,	New,		July 18, 1911.
North Main street,	2,031	Brick,	New,	881	Sept. 20, 1910.
Orchard street,	54	Tar concrete,	Skim coat,	2,083	Oct. 18, 1910.
State street,	383	Cement concrete,	New,		June 6, 1911.
Sumner avenue,	824 }	Tar concrete,	Skim coat, }		July 18, 1911.
Wilmont street,	875 }		New,		Aug. 8, 1911.
	14,783			8,544	
				3,865	

No sidewalk construction was ordered by abutters during the past fiscal year but 1,764 feet of four-inch curbing have been set by orders of abutters.

MACADAM REPLACED BY PAVING.

STREET.	Limits.	Length in feet.	Area in sq. yds.
Bridge street,	Water street easterly,	250	1,138
Court street,	Court Square avenue to Water street,	594	1,980
Liberty street,	Main street easterly,	311	1,335
Pynchon street,		868	2,810
Vernon street,		828	1,952
North Main street,	Calhoun to Grove street,	673	3,466
State street,	Terrence to Westminster street,	639	3,256
		4,158	15,937

TABLE OF PAVED STREETS.

Name	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Barnes street, Belmont avenue, Belmont street, Birnie avenue, Bridge street, Bridge street,	Hall street westerly, Hall street to Oakland, Hooker street northerly, Main to Dwight, Dwight to Chestnut,	Bitulithic, Catskill blocks, Metropolitan blocks, Johnsonburg blocks, Rock asphalt, Creo-resinate wood bl'ks, 3" x 8 1/2" x 8", Asphalt blocks, 5" x 12" x 3",	178 1,362 1,028 145 688 122 195	552 1,211 914 483 2,525 446 712	1909 1901 1903 1906 1900 1910 1910
Bridge street, Bridge street, Bridge street, Catharine street, Charles street, Chestnut street, Chestnut street, Chestnut street, Chestnut street,	Main street, 493 feet westerly, extension to Water street, Water street to Old Toll bridge, State to Bay, Liberty to land of B. & A. R. R., Worthington to Lyman, Lyman to B. & A. R. R., B. & A. R. R. to Linden, Linden to Everett,	Bitulithic, Bitulithic, Granite blocks, Syracuse brick, Granite blocks, Granite blocks, Granite blocks, Granite blocks, Creo-resinate wood bl'ks, 3" x 8 1/2" x 6" to 10", Granite blocks, Syracuse brick,	493 252 249 1,722 150 472 256 1,640 419 354 1,015	1,746 895 713 5,691 876 1,673 1,471 5,235 1,438 718 3,482	1905 1911 1907 1900 1903 1895 1899 1892 1909 1893 1900
Chestnut street, Chestnut street,	Everett to Carew, Carew to Allendale,				

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Chestnut street,	Allendale to Jefferson avenue,	Bitulithic,	825	2,898	1905
Court street,	Main to Court Square avenue,	{ Rock asphalt, Syracuse brick, Syracuse brick,	317 — —	1,149 174 128	1897 1897 1907
Court street,	Court Square avenue to Water st.,	Bitulithic,	617	2,699	1911
Court Square avenue,	Court to Elm,	{ Rock asphalt, Syracuse brick,	193 —	503 380	1897 1897
Cypress street,	Main street westerly,	Granite blocks,	459	1,700	1904
Cypress street,	Boylston to Fulton,	Granite blocks,	216	848	1905
Dwight street,	State to Lyman,	Syracuse brick,	2,324	9,905	1896
East Court street,	Main to Market,	Rock asphalt,	117	297	1900
Elm street,	Main to Court Square avenue,	{ Rock asphalt, Syracuse brick,	343 —	949 330	1897 1897
Ferry street,	Main street to foot of hill,	Bitulithic,	1,389	3,597	1910
Fort street,	Main to Water,	Granite blocks,	670	1,770	1895
Fulton street,	Cypress to Vine,	Granite blocks,	1,125	3,006	1906
Hampden street,	Main street westerly,	Bitulithic,	212	821	1904
Hampden street,	completion, Main to Water,	Bitulithic,	394	1,539	1905
Harrison avenue,	Main to Dwight,	Trinidad asphalt,	596	2,247	1896
Hillman street,	Main to Dwight,	Bitulithic,	648	2,025	1906

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
King street,	St. Ry. turnout,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	317	1,023	1908
Liberty street,	Main street, easterly,	Bitulithic,	311	1,335	1911
Liberty street,	Chestnut to Cass,	Syracuse brick,	1,399	4,571	1900
Liberty street,	Cass to Heywood avenue,	Syracuse brick,	1,147	3,971	1901
Lyman street,	Main to Chestnut,	Granite blocks,	1,306	4,599	1889
Lyman street,	Chestnut street, easterly,	Granite blocks,	503	2,095	1908
Lyman street,	extension easterly to Spring st.,	Granite blocks,	228	949	1909
Main street,	Locust to Marble,	Syracuse brick,	840	4,381	1897
Main street,	Marble to William,	Syracuse brick,	1,762	8,307	1896
Main street,	William to Bliss,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	1,150	6,460	1906
Main street,	Bliss to State,	Syracuse brick,	241	1,355	1893
Main street,	State to Worthington,	Creo-resinate wood bl'ks, 3" x 3½" x 8",	1,899	10,798	1904
Main street,	Worthington to Hampden, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 8",	382	1,183	1904
Main street,	Worthington to Hampden, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8",	—	962	1903
Main street,	Hampden to Lyman,	Creo-resinate wood bl'ks, 4" x 4" x 8",	153	775	1903

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Main street,	Lyman to Liberty,	Creo-resinate grooved wood bl'ks, 4" x 4" x 8",	464	2,780	1903
Main street,	Liberty to Sharon, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8",	453	1,135	1903
Main street,	Liberty to Sharon, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	—	1,487	1907
Main street,	Sharon to near Franklin and Emery,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	509	3,103	1907
Main street,	near Franklin, east side,	Syracuse brick,	36	144	1907
Main street,	Franklin to Carew, east side,	Syracuse brick,	1,302	4,605	1897
Main street,	Emery to Sargeant, west side,	Catskill blocks,	1,447	5,449	1901
Main street,	crossing opposite Auburn street,	Catskill and Metropoli- tan blocks,	—	163	1903
Maple street,	Central to High,	Bitulithic,	1,563	5,665	1904
Maple street,	High to State,	Bitulithic,	593	2,530	1905
Market street,	State to Harrison avenue,	Bitulithic,	968	1,887	1906
North Main street,	Plainfield to Morgan,	Bitulithic,	730	4,485	1906
North Main street,	Morgan to Bancroft,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	879	4,544	1909
North Main street,	Bancroft to Calhoun,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	839	4,210	1910

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
North Main street,	Calhoun to Grove,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	673	3,466	1911
North Main street,	at Wason avenue,	Syracuse brick,	—	196	1908
Plainfield street,	Sargeant to Fulton,	Syracuse brick,	1,710	10,249	1902
Pyncheon street,	Main to Water,	Bitulithic,	870	2,866	1911
Railroad street,	Main to Water,	Granite blocks,	516	1,539	1906
Sanford street,	Main to Market,	Rock asphalt,	102	207	1900
State street,	Main street, westerly,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	598	2,357	1909
State street,	Main to Dwight,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	478	2,403	1908
State street,	Dwight to City Library,	Granite blocks,	541	1,631	1890
State street,	Dwight to Chestnut (widened),	Granite blocks,	—	217	1896
State street,	Federal to Oak,	Syracuse brick,	847	4,590	1897
State street,	Oak to Stebbins,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	762	3,031	1909
State street,	Pleasant to Terrence,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	386	1,497	1910
State street,	Terrence to Westminster,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	639	3,256	1911
State street,	at Walnut,	Syracuse brick,	—	278	1908

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
State street,	at St. James avenue, Sherman to Highland Div., N. Y., N. H. & H. R. R., Spring to near Autumn, Autumn to Kibbe avenue, Kibbe avenue to point 85' west of Federal, Main to Dwight,	Syracuse brick,	—	183	1907
State street,		Bitulithic,	820	4,352	1905
Summer street,		Granite blocks,	567	1,512	1907
Summer street,		Granite blocks,	1,259	4,029	1895
Summer street,	Main to Dwight,	Granite blocks,	787	2,635	1901
Taylor street,		Bitulithic,	770	2,580	1904
Townslay avenue,		Bitulithic,	142	214	1908
Vernon street,		Bitulithic,	821	2,047	1911
Walnut street,	State to Union, Union to Pendleton avenue, Pendleton ave. to Lebanon st., Lebanon to Hancock, at Ashley,	Syracuse brick,	638	2,144	1899
Walnut street,		Syracuse brick,	873	3,140	1900
Walnut street,		Bitulithic,	1,195	3,888	1905
Walnut street,		Bitulithic,	1,005	3,334	1906
Walnut street,	Allen to Orange, Main to Dwight, Dwight to Fairbanks place, Fairbanks place to east line of Spring,	Bitulithic,	—	44	1911
White street,		Syracuse brick,	1,610	2,400	1902
Worthington street,		Syracuse brick,	739	2,544	1896
Worthington street,		Syracuse brick,	1,060	3,869	1901
Worthington street,	Main to Broadway,	Syracuse brick,	269	1,003	1903
Worthington street,		Bitulithic,	404	1,418	1905

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year Laid.
Worthington street,	Broadway to Water street,	Creo-resinate wood bl'ks, 3" x 8½" x 6" to 10",	299	1,061	1909
Worthington street, at Sackett place,		Creo-resinate wood bl'ks, 3" x 8½" x 6" to 10",	265	886	1908
Worthington street,	Federal to Armory.	Creo-resinate wood bl'ks, 3" x 8½" x 6" to 10",	874	1,312	1908
Total,			64,629	244,475	

RECAPITULATION.

Material.	Length in feet.	Length in miles.	Area in sq. yds.	Material.	Length in feet.	Length in miles.	Area in sq. yds.
Bitulithic,	15,200	2.879	58,417	Metropolitan blocks,	1,028	.194	996
Catakill blocks,	2,809	.532	6,741	Rock asphalt,	1,760	.338	5,630
Creo-resinate wood blocks,	12,080	2.287	59,613	Syracuse brick,	19,534	8.7	77,920
Granite blocks,	11,297	2.140	36,716	Trinidad asphalt,	586	.111	2,247
Johnsonburg blocks,	145	.027	488	Asphalt blocks,	195	.037	712
				Total,	64,629	12.24	244,475

STREETS MADE PUBLIC.

BY ORDER OF THE CITY COUNCIL.

Name.	Limits.	Length in feet.	Width in feet.
Belmont place, Berendo street,	Belmont avenue southerly, Grenada terrace to Alder- man street,	215 370	47 60
Birnie avenue exten- sion,	Arch street to Plainfield street,	839	36
Genesee street, Ledyard street,	Franklin street northerly, Armory street to Liberty street,	219 565	48 50
Locust street exten- sion,	Belmont avenue to Dickin- son street,	2,415	58
Mill street exten- sion,	Main street to Pecousic avenue,	588	60
Orleans court, Sorrento street,	Oak street to Orleans street, Sumner avenue to Alderman street,	338 870	16-20-13 60
St. James circle,	St. James avenue to Jennette avenue,	1,181	50
	1.429 miles.	7,550	

STREETS RELOCATED AND WIDENED.**BY ORDER OF THE CITY COUNCIL.**

Name.	Limits.	Length in feet.	Width in feet.
Fulton street,	Plainfield street southerly,	227	40.5
Longhill street,	Edgeland avenue southerly,	364	66-74
Longhill street,	Cherryvale avenue southerly,	628	74
Main street and Longhill street,	both corners,	191	
Pecousic avenue and Main street,	both corners,	184	
		1,594	

CONCRETE SEWERS—1911.

STREET.	LIMITS.	Size and Shape.	Length in Feet.	Total Cost.	Total Cost per Lineal Foot.	No. of Man-holes.	Total Cost of Man-holes.	Width of Trench.	Average Depth of Cutting.	Material Excavated.
Central st.....	Morris to Maple st	2' 3" circular	463	\$2,332.17	\$5.04	3	\$119.69	4.0	12.0	Fine blue sand, clay, and loam
Franklin st.....	Garden Brook, easterly to Chestnut st.....	2' 2" x 3' 3" egg shape	919	4,106.94	4.47	—	—	5.3	10.0	Muck, fine blue sand
Total			1382	\$6,439.01			\$119.69			
Retained.	135' of 4" underdrain.	240' of 8" underdrain.								

SEWER CONSTRUCTION—1911.

STREET.	LIMITS.	VITRIFIED CLAY PIPE.							Total Length.	Total Cost of Sewer.	Total Cost per Linear Ft.	Average Depth of Cutting.	Width of Trench.	Material Excavated.
		24"	30"	18"	15"	12"	10"	8"						
Applewood place.	Belmont ave., northerly							469	469	\$391.81	\$0.84	8.5	3.5	Sand
* Blake Hill	Fort Pleasant ave., easterly							211	211	217.88	1.03	5.5	3.5	Clay and hardpan
Brightwood ave.	Plainfield st., westerly							171	171	178.00	1.04	11.6	3.5	Clay, gravel, and sand
Bristol st.	Marlborough st., southerly, extension			171				532	532	293.80	.53	4.8	3.0	Gravel, hardpan, and sand
Brooklyn ave.	Sumner ave., southerly					423		307	307	329.56	.77	9.0	3.0	Sand
Brunkwick st.	Brooklyn ave., southerly							860	860	190.48	.62	7.5	3.5	Sand
Center st.	Oak Grove ave., northerly, extension							860	860	228.35	.38	3.9	2.5	Ashes, rubbish, and sand
* Central st.	Main to Maple st.	460	434						894	2,605.22	2.98	12.0	4.0	Fine blue sand, clay, and loam
* Chestnut st.	Worthington to Bridge st.	353							353	1,148.06	3.25	10.0	4.0	Clay, hardpan
Claremont st.	Orange st., southerly							492	492	394.58	.54	3.5	3.0	Sand
Clermont st., I. O.	Healey ave., easterly							150	150	123.98	.82	6.0	3.5	Sand
* Clifton ave.	Central st., westerly							111	111	54.58	.49	8.8	3.5	Sand
* Cumberland st.	Extension easterly to North st.					238			238	284.06	1.19	9.0	3.5	Clayey loam, fine blue sand
* Florida st.	Worthington st., northerly to Ingersoll Grove.								834	978.89	1.17	10.0	3.5	Sand and gravel
* Foster st.	Knox st., easterly			555	279			611	611	517.25	1.12	7.5	3.5	Sand
* Franklin st.	Garden Brook, easterly to Chestnut st.		295						295	632.82	2.21	10.0	5.5	Muck, fine blue sand
Greenacre sq.	Foster st., easterly							201	201	149.62	.74	6.5	3.5	Sand
* Greenacre sq., north	Foster st., easterly							246	246	163.73	.67	6.5	3.5	Sand
Hamphshire st., I. O.	Pine st., westerly							394	394	391.15	1.21	6.8	3.5	Sand and gravel
Healey ave., I. O.	Worcester st., southerly							336	336	270.40	.83	5.0	4.0	Sand and filling
Hiawatha st.	White st., westerly		326					383	383	298.80	.70	7.8	3.5	Sand
Hollywood st.	Dickinson st., easterly							174	174	121.04	.69	7.1	3.5	Sand
Homer st.	State st., southerly, extension.							94	94	99.81	1.06	7.0	3.5	Sand
Ingersoll Grove.	Florida st., easterly							146	146	71.14	.49	6.8	3.5	Sand
Johnson st., I. O.	Main to South st.							590	590	1,254.26	1.30	6.5	4.0	Sand and hardpan
* King st.	Eastern ave. to Logan st.							477	477	701.20	1.47	8.7	3.5	Sand and loam
* Knox st.	Windsor st., southerly							34	34	47.68	1.41	7.5	3.5	Clay and sand
* Laurel ave.	Extension towards Conn. river.			34					20	44.62	2.23		3.0	Marl
* Lyman st.	Extension easterly, from near Chestnut.								202	874.52	4.33	14.0	4.0	Clayey loam
* Main st.	Locust to Mill st.			292	204				779	1,800.52	2.45	6.0	3.0	Gravel, hardpan, and rock
Main st., I. O.	Bay st., westerly, extension			285	149				149	193.37	1.30	5.8	3.5	Gravel
* Mill st.	Dickinson st., easterly to Noel st.	325							335	619.85	1.91	7.8	4.0	Hard gravel, sand

SEWER CONSTRUCTION—1911.—CONTINUED.

STREET.	LIMITS.	VITRIFIED CLAY PIPE.							Total Cost of Sewer.	Total Cost per lineal ft.	Average Depth of Cutting.	Width of Trench.	Material Excavated.
		24"	20"	18"	15"	12"	10"	8"					
Mulberry st.....	Maple to School st.....				426	270			\$873.04	\$1.25	8.4	4.0	Clay and sand
10 Noel st.....	Mill st., southerly.....		204	146					569.64	1.63	8.1	3.5	Sand, gravel, clay, and hardpan bottom
North st.....	Ferry st., northerly.....						148		223.34	.51	7.9	3.5	Loam, marl, and silt
North Main st.....	Osgood st., southerly.....						199		641.23	3.22	9.0	3.5	Sand and marl, 6 ft. clay bottom
11 North Main st.....	Eagle st., northerly, extension.....	39							88.55	2.27	8.0	4.0	Sand
North Main st.....	Walnut st., northerly, extension.....					292			181.36	.72	5.0	3.0	Sandy loam
Oak st.....	Walnut to Taylor st.....					177			297.10	1.68	10.0	3.0	Sand
Oak Grove ave.....	Ray st., southerly, extension.....			177			50		42.81	.86	6.0	3.0	Sand and gravel
Oak Grove ave.....	Center st., northerly.....					492			105.85	.40	3.5	3.0	Sand and gravel
Orange st.....	Extension easterly near Allen st.....					225			103.88	.46	3.3	3.5	Sand
Orlando st.....	Belmont ave., northerly.....					246	193		396.28	.90	8.5	3.5	Sand
111 Plainfield st.....	Sanderson terrace, southerly, extension.....	148							535.51	3.62	14.0	5.0	Fine sand
Prescott st.....	Belmont ave., northerly.....					340			195.23	.57	8.5	3.5	Sand
Prospect st.....	Massasoit st., easterly, extension.....				335	423			726.53	.97	9.2	4.0	Sand, gravel, and clay
Spencer ave.....	Summer ave., southerly.....				282	315			451.29	.76	9.0	3.5	Sand, hardpan bottom
Summer ave.....	Castle ave., easterly, extension.....					629			606.95	.97	11.3	3.5	Sand
1 Taylor st.....	Main to Dr., light st.....		330	321	197				2,099.63	2.48	10.1	4.0	Clay and loam
Thornlike st.....	Summer ave., southerly.....					116			148.93	1.28	11.0	3.5	Sand, hardpan bottom
1 Wellesley st.....	St. James ave., to Cornell st.....				226	224			540.30	1.17	10.0	3.5	Sand and gravel
1 Windsor st.....	Knox st., westerly.....					308	265		560.76	.98	8.5	3.5	Sand
Total.....		1325	1763	1127	2296	4896	7723	111	19,241	\$25,179.11			

*Completed.

†Incomplete.

†Re laid.

†Stormwater.

‡Does not include cost of connections to buildings or street inlets.

1 135' of 4" underdrain.

1 223' of 4" underdrain.

1 146' of 4" underdrain.

1 18' of 4" underdrain.

1 148' of 3" underdrain.

1 330' of 6" underdrain.

1 270' of 3" underdrain.

***COST OF SEWER SYSTEM TO DECEMBER 1, 1911.**

YEARS.	CONSTRUCTION.	MAINTENANCE.	TOTAL.
1863-1880 inclusive	\$357,168 72	\$38,178 38	\$395,342 10
1881	43,902 05	2,359 29	46,261 34
1882	28,391 33	3,039 25	31,430 58
1883	26,573 85	4,039 33	30,613 18
1884	36,035 22	2,929 25	38,964 47
1885	29,199 74	2,477 23	31,676 97
1886	25,313 73	2,541 81	27,855 54
1887	33,967 31	2,376 47	36,343 78
1888	30,872 07	3,951 21	34,823 28
1889	24,123 28	6,056 46	30,179 74
1890	20,722 72	10,004 42	30,727 14
1891	25,568 51	6,412 75	31,981 26
1892	27,381 84	6,823 51	34,205 35
1893	25,743 24	8,553 66	34,296 90
1894	27,142 69	7,236 53	34,379 22
1895	23,905 82	7,598 31	31,504 13
1896	45,299 89	8,634 30	53,934 19
1897	33,976 14	8,790 00	42,766 14
1898	47,751 26	6,986 99	54,738 25
1899	51,246 07	8,594 56	59,840 63
1900	140,380 89	9,862 21	150,243 10
1901	80,276 02	13,272 25	93,548 27
1902	38,904 19	12,909 40	51,813 59
1903	29,169 75	9,034 88	38,204 63
1904	46,339 05	12,916 69	59,255 74
1905	40,831 47	9,620 62	50,452 09
1906	24,419 73	12,444 00	36,863 73
1907	47,977 73	10,797 97	58,775 70
1908	62,949 97	10,468 88	73,418 85
1909	39,013 60	11,002 42	50,016 02
1910	43,909 33	13,196 60	57,105 93
1911	34,186 56	12,836 07	47,022 63
	\$1,592,638 77	\$285,945 70	\$1,878,584 47

*Does not include cost of connections to buildings or street inlets.

*PRECIPITATION FOR CALENDAR YEAR—1911.

Month.	Total in Inches.	Greatest Amt. in 24 Hours.	Dates.	Portion of Storms in which the Precipitation exceeded Half Inch per Hour.	Max. Rate per Hour— Inches.	Duration of Max. Rate— Minutes.
Jan.	2.15	.72	27-28	Mar. 27, .18 inch in 10 min.	1.08	10
Feb.	1.57	.99	4	June 7, .28 " " 20 "	.84	20
March	3.40	1.06	27	July 5, .7 " " 21 "	3.60	8½
April	2.03	1.13	4-5	" 20, .09 " " 5 "	1.08	5
May	1.37	.65	May 31- June 1	" 24, .5 " " 30 "	1.00	30
June	2.47	.74	6-7	" 24, .33 " " 10 "	1.98	10
July	3.81	1.14	24	Aug. 15, .5 " " 30 "	1.00	30
Aug.	6.76	2.42	28-29	" 28, .5 " " 30 "	1.00	30
Sept.	3.94	1.03	9	" 29, .84 " " 50 "	1.00	50
Oct.	8.66	5.80	18-19	Sept. 11, .33 " " 20 "	.99	20
Nov.	3.35	.81	18	Oct. 18, .5 " " 30 "	1.00	30
Dec.	2.33	1.13	22-23	Nov. 12, .19 " " 15 "	.76	15
Total	41.84					

*Includes rain, melted hail, sleet and snow.

Number of days in which precipitation exceeded .01 inch,	. . . . .	110
Number of days during which snow and sleet fell,	. . . . .	33
Date of last snowfall in spring,	. . . . . Apr.	19
Date of first snowfall in fall,	. . . . . Nov.	15
Highest water in Connecticut river and date,	. . . . . Apr.	17, 11.8'
Lowest water in Connecticut river and date,	. . . . . Aug.	25, 3.4'
Annual range of Connecticut river,	. . . . .	8.4'
Mean daily height of Connecticut river,	. . . . .	5.68'
Greatest 24-hour rise and date,	. . . . . Oct.	18, 3.5'
Greatest 24-hour fall and date,	. . . . . Apr.	11, 1.2'

Rainfall since 1891 amounting to 7 Inches or more per Month.		Rainfall since 1891 amounting to 4 Inches or more in 24 Hours.	
July, 1897,	. . . 14.68 inches.	July 13, 1897,	. . . 5.08 inches.
June, 1903,	. . . 8.33 "	Aug. 1-2, 1904,	. . . 4.04 "
Aug., 1904,	. . . 7.22 "	Sept. 14-15, 1904,	. . . 4.00 "
Sept., 1907,	. . . 8.27 "	Apr. 14-15, 1909,	. . . 4.03 "
Aug., 1908,	. . . 6.99 "	Oct. 18-19, 1911,	. . . 5.80 "
Oct., 1911,	. . . 8.66 "		

PRECIPITATION—1892-1911.

YEAR.	TOTAL IN INCHES.	YEAR.	TOTAL IN INCHES.
1892.....	37.70	1902.....	46.74
1893.....	39.72	1903.....	43.91
1894.....	37.43	1904.....	39.12
1895.....	36.66	1905.....	32.83
1896.....	36.33	1906.....	42.37
1897.....	53.25	1907.....	44.11
1898.....	49.18	1908.....	36.06
1899.....	34.78	1909.....	34.96
1900.....	43.62	1910.....	32.18
1901.....	52.84	1911.....	41.84
		Total.....	805.17

40.25 yearly average for 20 years.

GENERAL STATISTICS.

CITY OF SPRINGFIELD, MASS., DECEMBER 1, 1911.

Springfield is situated on the east bank of the Connecticut river, in latitude 42° 06' north, longitude 72° 35' west, at an elevation above sea level of from 65 to over 215 feet.

Zero of "City Base" is 27.1 feet below sea level.

State street, at corner of Main street, is 65.9 feet above sea level, or 93 feet "City Base."

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner ave. at corner of Belmont ave. is 187.9 feet above sea level.

Highest elevation in city (Markham Hill) 320 feet above sea level.

Greatest extent of city, north and south, 5.9 miles

Greatest extent of city, east and west, 8.9 miles

Connecticut river frontage, 4.65 miles

Area, including those portions covered by water, approximately, 24,661 acres

Area by wards: Ward One, 1,733.6 acres; Two, 225.7 acres; Three, 234.8 acres; Four, 413.2 acres; Five, 400.6 acres; Six, 327.4 acres; Seven, 2,197.7 acres; Eight, 19,128.3 acres. Area taxed, 16,185 acres.

Total park areas, 589.84 acres; Forest Park, 476.10 acres.

Population, estimated April 1, 1911, 92,048

Number of voters: men, 14,849; women, 295; total, 15,144

Number of polls, April 1, 1911, 25,852

School enrollment:	{	public, day,	16,074	{	18,747	{	20,981
		public, night,	2,673				
		parochial,	2,234				

Valuation,	{	Real estate,	\$102,393,280	{	\$127,057,660
		April 1, 1911, { Personal,	24,664,430		

Tax rate, \$16.50 per \$1,000.

		Square yards.	Miles.
Public streets accepted to Dec. 1, 1911,	} 160.568 miles.	Wood block,	59,613 2.287
		Granite block,	36,716 2.140
		*Syracuse brick,	77,920 3.700
		Other brick pavers,	8,220 .753
		Sheet asphalt,	7,877 .444
		Asphalt blocks,	712 .037
		Bitulithic,	53,417 2.879
		†Macadam,	1,335,033 73.785
		Gravel or dirt,	74.543
			160.568

Sidewalks laid in public streets to Dec. 1, 1911, about 174.4 miles.

*Does not include brick pavement in railway tracks around Court Square.

†Includes Pecousic avenue and Longmeadow street through Forest Park under the care of the Park Department.

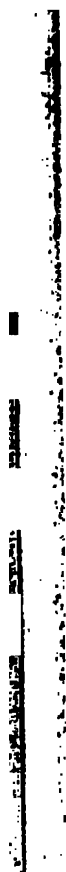
Electric railways, Dec. 1, 1911 (double track counted twice),

In public streets,	.	.	.	.	51.230 miles
On private property,	.	.	.	.	4.379 miles
					<hr/> 55.609 miles
Steam railroads,	.	.	{	Four tracks, about	4.5 miles
			{	Double tracks, about	7. miles
			{	Single track, about	11. miles
Water mains,	.	.	.	.	188.87 miles
Gas mains, July 1, 1911,	.	.	.	.	141.98 miles
Sewers, 124.778 miles,	.	.	{	Brick sewers,	26.024 miles
			{	Vitrified clay pipe,	71.698 miles
			{	Cement pipe,	22.793 miles
			{	Wood pipe,	.193 miles
			{	Cast iron,	.028 miles
			{	Concrete,	3.917 miles
			{	Brick-concrete,	.125 miles
Street lights, arc,	1,247			Post offices,	4
Street lights, incandescent,	309			Post office sub-stations,	17
Dwelling houses,	14,428			Police stations,	2
Schoolhouses,	36			Railroad stations,	5
Churches,	62			Engine houses,	13
Fire apparatus: motor driven,				Fire apparatus: horse drawn,	
Hose and chemical wagons,	6			Steam fire engines,	8
Aerial trucks,	2			Hose wagons,	7
Water towers,	1			Ladder trucks,	5
Trolley transportation car,	1			Aerial truck,	1
Commercial truck,	1				
Auxiliary squad automobiles,	2				
Spare auxiliary automobile,	1				
Automobiles for Chief, Assistants, and Supt. Fire Alarm,	5				

PRINCIPAL CITY EXPENDITURES.

Assessors' department,	.	.	.	.	\$14,908.64
Board of Health,	.	.	.	\$12,069.15	33,607.18
Board of Health, Isolation Hospital,	.	14,696.77			
Board of Health, Isolation Hospital addition,	.	8,841.26			
Central Heating plant,	.	.	.	.	61,284.52

City Engineering department,	.	.	.	.	\$13,249.96
City Library Association,	.	.	.	.	54,448.28
Collector's department,	.	.	.	.	10,545.74
Commissioners of the sinking funds,	.	.	.	.	91,278.41
Contingencies,	.	.	.	.	49,114.89
County tax,	.	.	.	.	107,858.85
Fire Depart- ment,	{	Maintenance,	.	247,352.79	321,932.88
		New buildings and additions,	.	32,652.31	
		Fire alarm system,	.	30,000.00	
		Motor apparatus,	.	11,927.78	
Fire and Police headquarters,	.	.	.	.	177,524.05
Forestry,	.	.	.	18,957.90	26,611.22
Forestry, new buildings,	.	.	.	7,653.32	
Highways and Bridges.	{	Maintenance,	.	153,446.86	401,431.45
		Bridges,	.	2,838.63	
		Paving,	.	50,382.44	
		Macadam and Gravel,	.	38,418.34	
		Walks and Curbing,	.	14,288.04	
		Special accounts,	.	32,800.49	
		Ashes collection,	.	48,144.65	
		Garbage collection,	.	21,678.94	
	{	Watering streets,	.	39,433.06	
			.		
Interest,	.	.	.	.	245,526.55
Lighting streets,	.	.	.	.	104,246.23
Municipal group,	.	.	.	.	319,474.94
Pauper department,	.	.	.	.	52,749.46
Police and Watch,	.	.	.	154,829.58	158,213.28
Police signal equipment,	.	.	.	3,383.70	
Public parks (including menagerie building \$27,164.44),	.	.	.	.	77,867.82
Schools,	.	.	.	635,098.74	685,145.77
Schools, new buildings, etc.,	.	.	.	50,047.03	
Sewers,	.	.	.	.	47,022.63
State Treasurer, taxes,	.	.	.	.	191,599.32
Water Works, cash expenses,	.	.	.	277,919.38	356,302.59
Water Works, Little river water supply,	.	.	.	78,383.21	
					<hr/> \$3,603,964.66



613.127

Report of

City Engineer

Springfield
Mass.



For the Year 1912



Report of

City Engineer

City of Springfield
Massachusetts

1912

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REPORT OF THE CITY ENGINEER.

CITY OF SPRINGFIELD, MASS., December 28, 1912.

To the City Council:—

In accordance with the provisions of the City Ordinances, the annual report of the Engineering Department for the year 1912 is respectfully submitted, with a statement of receipts and expenditures and a general description of the more important work, also such suggestions as have been considered in order.

FINANCIAL STATEMENT.

RECEIPTS.

Annual appropriation for the year 1912	\$13,200 00
Receipts from other city departments	2,797 36
Transferred from Reserve Fund	1,800 00
	<hr/> \$17,797 36

EXPENDITURES.

Salaries of City Engineer and assistants	\$13,236 01
Office rent and lighting	574 36
Drawing materials, stationery and general supplies	519 68
Car fares, automobile service and sundry office expenses	780 97
	<hr/> 15,111 02
Balance unexpended	<hr/> \$2,686 34

DESCRIPTION OF EXPENDITURES FOR SALARIES.**ENGINEERING DEPARTMENT.**

For all services performed on account of matters referred to the Board of Public Works by the City Council relating to the laying out or alteration of streets, sidewalks, sewers, and parks; for surveys and levels, plans and profiles, estimates of cost, releases from damages, reports to the City Council, and general correspondence and interviews relating to matters referred to the Board, and all clerical work performed relating to public hearings and all meetings of the Board; measuring and assigning house numbers, work upon house number books and records; furnishing street lines and grades to individuals for buildings, grading, fencing, and sidewalk construction; surveys, estimates, and all general services performed for the various committees of the City Council; general map, plan and profile drawing of streets, sewers, and public property for office records and for future reference; measuring and recording all sewer connections for house drains and furnishing lines and grades for same; preparation of plans and photographs for the City Solicitor's use; indexing plans and other office records; photographing and blue printing; examination of deed records, setting of street monuments, and all other services not charged to other city departments, the sum of \$9,527.03

HIGHWAY DEPARTMENT.

For all services performed on account of and charged to the street work appropriation; estimates and plans, lines and grades for paving, macadam and gravel, final measurements, inspection of new paving and repairs, and bridge repairs and maintenance, and all other incidental work, the sum of \$959.32

SIDEWALKS AND CURBING.

For all services performed for the general sidewalk and curbing appropriation; lines and grades for laying out and for

construction, measurements for assessments, and all work incidental thereto, the sum of \$580.17

SPRINKLING STREETS.

Measuring streets and private ways and computing areas, the sum of \$6.09

LOCUST STREET LAYOUT.

Construction surveys, staking out lines and grades, general supervision and direction, and all incidental work, the sum of \$102.35

BIRNIE AVENUE EXTENSION.

Construction surveys for street and retaining wall masonry, staking out grades and general supervision and direction, the sum of \$547.01

SEWER DEPARTMENT.

For all services performed on account of the general sewer appropriation; plans, estimates, laying out of work and general supervision of construction details, and all other incidental work, the sum of \$489.41

ASSESSORS' DEPARTMENT.

Surveys and plans, computations of areas and dimensions for plans of private property, examination of deed records, and corrections of old plans, the sum of \$395.48

PARK DEPARTMENT.

Lines, levels and grades for Trafton road; walk grades for Washington boulevard, the sum of \$48.61

PLAYGROUNDS.

Survey of lot and setting bounds at Emily Bill playground, the sum of \$27.72

*City Engineer's Report.***PAGE BOULEVARD.**

Staking out lines and grades and general supervision;
laying out and construction, the sum of \$106.39

GARBAGE REDUCTION PLANT OR GARBAGE DISPOSAL.

Levels for sewer, and survey of lot, the sum of \$45.63

FIRE DEPARTMENT.

Line for retaining wall at Patton street engine house, the
sum of \$3.65

RIVER FRONT.

Plans and maps for development and cost of Robinson
plan, the sum of \$277.84

MAP OF CITY.

Map of Springfield for use in Municipal Building, the
sum of \$56.31

MUNICIPAL GROUP.

Laying out sidewalks and grounds, the sum of \$12.36

WALKER LITHOGRAPH PUBLISHING COMPANY.

Work on City map, the sum of \$15.00

HIGH SCHOOL OF COMMERCE.

Borings and test pits for examination of soil to determine
suitability for foundation, the sum of \$35.64

\$13,236.01

GENERAL WORK.

The department has responded to all requests made during the year in the usual way, the large number and miscellaneous character of these calls making it difficult to provide at all times in a manner satisfactory to the department.

STREET WORK.

As considerable of the service performed by the department relates to streets and sidewalks, it will be seen that opportunity is afforded for general observation and study of results obtained.

A very commendable effort has been made during recent years on the part of engineers and superintendents concerned with street and road improvements to find a material for surface treatment of macadam roads that shall secure results in the main similar to those obtained from the more enduring and expensive forms of so-called permanent paving. Many of these methods of treatment have been shown conclusively to be inadequate to meet the conditions imposed, due to the character of the traffic.

TAR AND ASPHALT METHODS.

The various forms of surface treatment with tar materials have, in the main, been shown to be of little service especially when applied as a binding and strengthening material, and the constant repairs and renewals of this form of road surface, as applied to state roads and city streets, demonstrates the temporary character of such work.

Doubtless the quality of tar bitumen is not sufficiently dependable or stable to be satisfactory for such use.

ASPHALT PRODUCTS.

The numerous varieties of bitumen known as asphalt have been conclusively shown to be more satisfactory and stable as a binding material for street and road work than tar products, and will doubtless be extensively used in future work. It has been shown that, at small added expense per square yard, a macadam street or road can be laid with asphalt as a binding material that shall penetrate to a greater depth of the road material. This kind of work will, it is believed, be found

better adapted to city streets of lighter traffic and outlying roads than any form of construction in which tar products are used.

The severe nature of the effect on macadam streets and roads, occasioned by the heavier automobiles propelled at high speeds, shows that a more substantial kind of road construction must be used than the surface treatments so largely experimented with during recent years.

The street work of the year has included the general improvement of Sumner avenue and Belmont avenue with macadam in which Texas and Bermudez asphalt were used for a depth of about three inches of macadam material. This work has cost about \$1.15 per square yard and good results are expected. This kind of macadam road requires the use of about two gallons of asphalt per square yard, and according to expert opinion it is doubtful if a satisfactory and enduring street surface can be obtained by the use of a smaller quantity of bitumen.

ENDURITE.

Endurite pavement was introduced in this city for the first time this year, and Pearl street, from Chestnut to Spring; Oak street, from State to Walnut; Charles street, from Liberty to Franklin; and Chestnut street, Worthington to Bridge and from Pearl to Mattoon street, have been paved with this material. As this method of treatment is confined to the upper part of an old macadam surface of the water bound variety, it is not expected that it will prove as enduring as the methods extending the full depth of the broken stone or macadam.

The cost of the endurite, which was laid under contract, was \$1.33 per square yard.

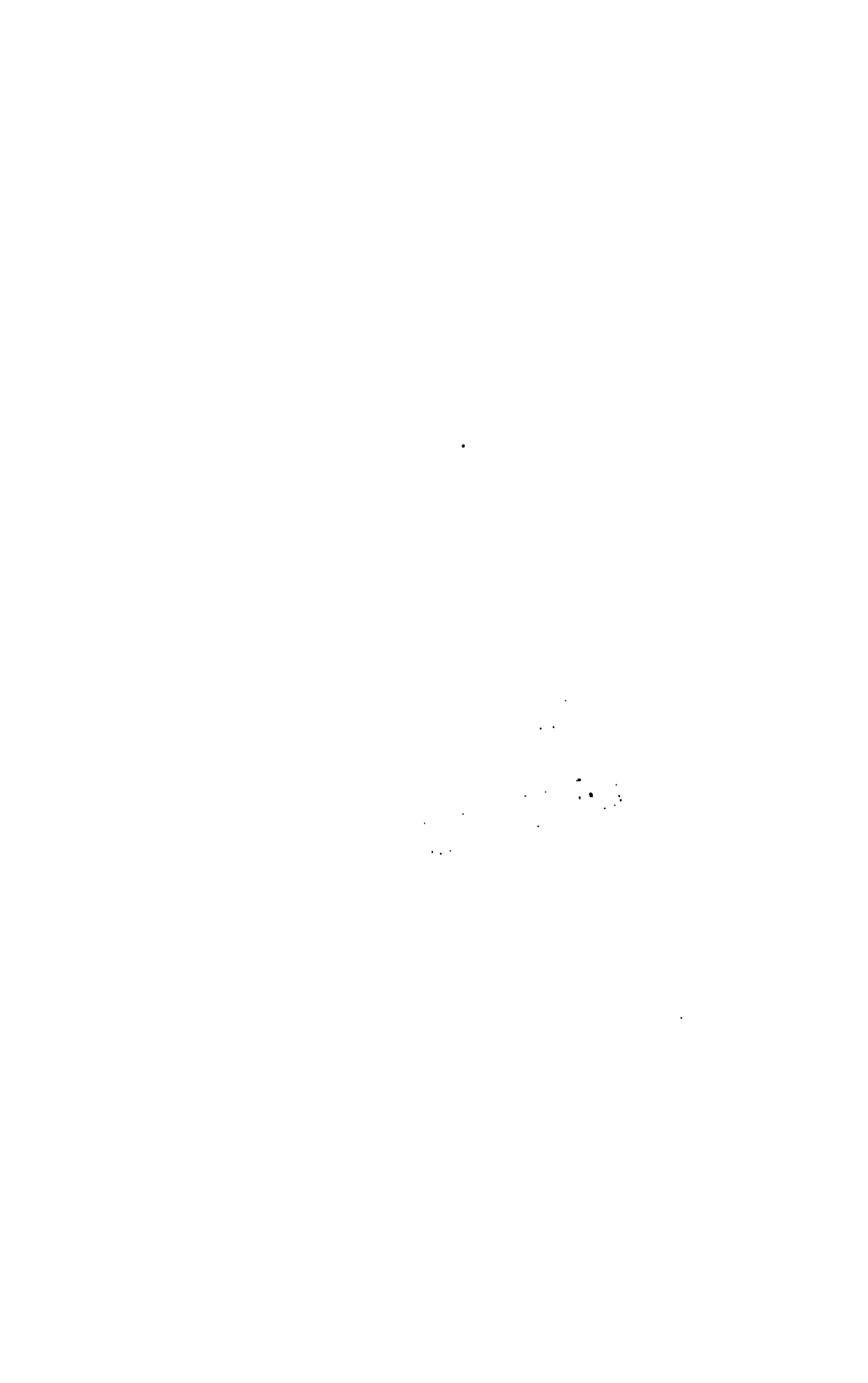
MACADAM. COST AND AMOUNT.

The total quantity of macadam laid of all kinds amounts to 100,271 square yards and cost \$96,688.



CHESTNUT STREET, LOOKING SOUTH FROM BRIDGE STREET,
SHOWING BITULITHIC PAVEMENT LAID IN 1912.







CHARLES STREET, LOOKING NORTH FROM LIBERTY STREET,
SHOWING ENDURITE PAVEMENT LAID IN 1912.

NEW STREET EXTENSIONS.

LOCUST STREET.

Locust Street extension was graded and left unfinished in the late season of 1911. During the present year a double track street car line has been added and a macadam roadway provided the full length of the extension, the street having been opened to public travel and is now complete.

BIRNIE AVENUE.

The work of extending Birnie avenue, from Arch to Plainfield street, was commenced early in the summer and the work prosecuted regularly until the middle of September, at which time all rough grading had been performed, and retaining wall masonry completed; also the reinforcing of the foundation of a section of the westerly retaining wall abutting on the Boston and Maine railroad property had been about two thirds completed. Owing to a train of circumstances over which this department had no control the work was abandoned for a considerable part of the remaining fall season. There now remains the completion of macadam roadway, the construction of a sidewalk on the westerly side of street and the erection of iron railings on retaining walls. This work, when finished, will complete a most valuable connecting link between the Brightwood district and the business part of the city, filling a long felt need.

PAGE BOULEVARD.

The demands of the unusual real estate activity and large manufacturing interests in the northeast section of the city, known as East Springfield, have been met by the laying out of a new thoroughfare from 70 to 85 feet wide, extending from St. James avenue to Highland terrace. A street car track has been laid and one half of the roadway macadamized for

full length. A sewer also is now being laid which will extend the full length of the layout.

A petition is now before the Board of Public Works asking for the acceptance as public ways of Highland terrace and St. James boulevard, from Page boulevard to the locality of the new Hampden Railroad crossing and passing the new plant of the Stevens-Duryea Automobile Company.

PAVING.

The policy has been followed, as in previous years, of extending the permanent paving as far as available means will permit.

The creosoted long leaf yellow pine block has been used, as for the last eleven years, laid on a concrete base. The wood block pavement continues to meet the approval of the public, affording a smooth and sanitary surface, and at the same time more nearly noiseless than any form of enduring paving material. Its cost is greater than any other form of pavement used here, the cost of the blocks alone, delivered here on the cars, being \$1.94 per square yard. Through competition bids received early in the season the price was reduced from \$2.10 per square yard to the figures above mentioned. All wood block paving work has been performed, as for many years, by the city, under the able direction of the Superintendent of Streets. A four and one half inch concrete base was used and the joints filled with sand.

The total cost to us of the wood paving amounts to \$39,374.00, a total of 12,515 square yards having been laid at an average price per yard of \$3.15.

BITULITHIC.

Chestnut street, between Bridge and Pearl streets, was paved under contract at a price per square yard of \$2.50, 952 square yards having been laid, the price including a concrete base.

PAVING REPAIRS.

A considerable amount has been expended in repairs to bitulithic and asphalt pavements, amounting to the sum of \$7,003.97 and covering an area of 3,343 square yards. Of the above repairs 1,383 square yards were due to cuts made for the various kinds of underground conduits and 1,960 square yards were from defects due to ordinary wear and tear. All repair work was done by contract. From the above it will be seen that the repairs to bitulithic pavements, due to ordinary wear, is still a very considerable amount, as has been the case for several years, or since the first year or two of the beginning of the laying of this form of pavement. Doubtless a considerable expenditure will be required for some years in the future for annual repairs to this form of pavement.

MUNICIPAL REPAIR PLANT.

In view of the area of bitulithic and asphalt pavements now laid, it is advised, in view of the large amount of annual repairs, that due consideration of the purchase and use of a repair plant be made, that shall be owned and operated by the city. This practice is getting to be quite common in many cities and good results are secured thereby, at the actual cost of the work, saving to the city the profit of the contractor. There seems no good reason why economical and satisfactory results should not be obtained, as in the case of other departments of work successfully executed by departmental work rather than by contract.

SEWERS.

The usual expenditure has been made for new extensions and relaying of old sewers during the year. Pursuing the policy followed in recent years, cement concrete has been used for all sewers larger than 24-inch vitrified pipe. The continual use of cement concrete has shown its durability and

all around destructive features for sewer construction. No injurious effects have been observed from chemical action and a very considerable saving is effected when compared with the cost of brick sewers of the same capacity.

EAST SPRINGFIELD SYSTEM.

The unusual activity in East Springfield in real estate and manufacturing development demanded consideration for a sewer system. The erection of a large manufacturing plant by the Stevens-Duryea Automobile Company required prompt action. After due consideration and study it appeared that the most feasible plan would be found in the extension of the Garden Brook sewer from Armory street a distance of about $2\frac{1}{4}$ miles northeasterly, through the valley between the railroads and across the Boston and Albany railroad, through Chicopee road, Page boulevard, Highland terrace and in St. James boulevard to the proposed easterly terminus. Construction was begun in the fall season at St. James avenue and has progressed through Page boulevard and is still in progress at time of this report. So far, the sewer, as laid, consists of 24-inch vitrified pipe. The section from Armory street to St. James avenue, as ordered, will be of cement concrete, and this work will be deferred until the following summer season. The total cost of this sewer has been estimated at \$72,100.00.

SEWER ENTRANCE FEES.

In a conference between the Board of Public Works and the Finance Committee, and incidental thereto, the question of sewer fees or charges was mentioned, resulting in a request that the Board of Public Works should investigate and report upon the expediency of a change in the prices charged. Early in the study it was found that the method pursued in this city of charging a flat fee of \$25.00 for an ordinary dwelling

was most unusual as to method. It was also found that the price charged was much less than the average of other cities. Correspondence with other cities resulted in a reply from thirty cities, nearly all of which assess for the cost of sewers in part according to frontage, many of them also assessing for area.

The average charge for the thirty cities was found to be \$54.00 per house lot, against the charge of \$25.00 in this city. It was also found that prior to 1880 the price charged here for each house lot was \$50.00, the price having been reduced that year to \$25.00. From a special report made by a committee of the City Council to the Mayor and Aldermen of the same year, 1880, it was further found that the amount received in sewer fees prior to that date amounted to less than 25% of the cost of the sewer system. An order was finally passed, based on the detailed report of the Board of Public Works and the recommendation of the Committee on Sewers, in which a charge of \$1.00 per front foot was established, with a minimum charge based on frontage of \$50.00 per house lot. The above applies to ordinary dwellings, with a further charge according to building area for other structures at a rate of 2½ cents per square foot of building area for the two lower stories, and one half a cent per square foot for each additional story.

The passage of the above order met with a strong opposition from real estate men and others, which resulted in hearings and protests. The Committee on Sewers was requested by the Board of Aldermen to further investigate the matter of fees to be charged, which resulted in the passage of a final order December 23, 1912, in which \$50.00 is to be charged per house lot as a flat rate without regard to frontage. Buildings other than ordinary dwellings are to be charged as provided in the previous order.

SIDEWALKS.

Portland cement concrete is fast superceding all other materials for sidewalk construction, and, in view of all around

good qualities and reasonable first cost, is to be recommended. In view of the necessity that careful specifications should be observed and followed for cement sidewalk construction, it is advised that the practice heretofore followed of allowing property holders to construct their own sidewalks without supervision or inspection on the part of the city, should be discontinued, and all such work executed by the city.

The city Street Department with its trained officials and men is in a position to secure good work in sidewalk construction and at minimum cost.

BOARD OF PUBLIC WORKS.

The Board has passed through a year of unusual activity and several matters of more than the usual magnitude and importance have been referred to them by the City Council for investigation, hearings, and reports.

Since the establishment of the Board in 1872 the City Engineer has acted as clerk and engineer for the Board, attending all hearings and office meetings.

Among the more important matters reported by the Board was the widening and extension of Dwight street, from the Boston and Albany railroad to Mill River, involving an estimated cost of \$1,400,000.00. Also reports will soon be made for the extensions of Dwight and Water streets under the Boston and Albany railroad, with costs estimated for Water street temporary structure, of \$70,000.00, and for Dwight street, with permanent type of construction, \$210,000.00. All three of the above recommendations are now in the hands of the City Council for further deliberation and final action.

The widening of Water street, between Whitney avenue and Bliss street, the widening and extension of Chestnut street, from Chicopee line to Mill River, the extension of Hillman and Taylor streets, and the laying out of a new thoroughfare on the hill section, from St. James avenue to Spring-

field street, comprise the more important matters now before the Board.

In all, the Board has held 133 hearings and office meetings during the year.

TABULAR INFORMATION.

The usual tabular statements of details pertaining to the several classifications of work with which the department has had to do will appear with this report when printed.

DEPARTMENT EMPLOYEES.

The usual force of assistants has been employed during the year. Assistant Engineer Mr. Herbert E. Flint, as in former years, has directed the detail of the work and the office force. Assistants Mr. Edward G. Martin, Mr. Charles A. L. Wright, Mr. Ernest F. Young, Mr. Charles J. Hancock, Mr. Edward W. Burnett, Mr. Rowland W. Greenwood, Mr. Irving P. Salisbury, Mr. Ernest T. Reilly and Mr. Robert A. Palmer have made up the regular office force. There have also been employed a portion of the year, Mr. Charles D. Todd, Mr. Wallace C. Day and Mr. Albert F. Christensen.

Miss Alice M. Hancock has performed the usual duties of stenographer, typewriter, and general office clerk.

In closing I desire to thank the assistants for their co-operation in the work and the various city officials for the pleasant relations sustained and the courtesies extended.

Respectfully submitted,

CHARLES M. SLOCUM.

City Engineer.

City Engineer's Report.

BOARD OF ALDERMEN. December 30, 1912.

Read, approved, ordered printed, and sent down for concurrence.

E. A. NEWELL, *Clerk.*

CITY COUNCIL. December 30, 1912.

Read and adopted.

GEO. J. CLARK, *Clerk.*

Presented to the Mayor. for approval December 31, 1912.

E. A. NEWELL, *City Clerk.*

MAYOR'S OFFICE, SPRINGFIELD, MASS., December 31, 1912.

Approved.

EDWARD H. LATHROP, *Mayor.*

WORK ITEMIZED.

BRIDGES.

REPAIRS AND CARE.

	Description of Work.	Cost.
*Abbe avenue overhead crossing,	Painting and railing repairs,	\$260 80
Armory street over B. & A. Railroad,	Floor repairs,	113 92
Armory street over N. Y., N. H., & H. Railroad,	Floor repairs,	55 40
Berkshire street, I. O., Red House crossing,	Floor repairs,	34 28
Ludlow—Indian Orchard,	Floor repairs,	18 96
Main street, I. O.,	Floor repairs,	221 66
North end, over Conn. River,	Replanking floor,	1,484 90
Old Toll,	Floor repairs and care,	595 06
Plainfield street,	Floor repairs,	138 35
South end, over Conn. River,	Strengthening floor system and laying wood blocks,	12,180 52
South end, over N. Y., N. H., & H. Railroad,	Laying wood blocks,	1,207 76
St. James avenue,	Floor repairs,	84 50
Sundry,	Floor repairs,	6 46
		<hr/> \$16,402 57

*Contract for labor painting paid in 1913.

STREET CONSTRUCTION.***GRADING AND GRAVELING.**

Street.	Length in feet.	Area in sq. yds.	Total Cost.
Kensington avenue, completion,			\$516 34
Knox street,	1,125	3,750	1,485 13
Lester street,	635	2,118	200 41
Maplewood terrace,			90 50
Riverview terrace,			440 02
Wilmont street, completion,			56 71
	1,760	5,868	\$2,789 11

*Old gravel taken from new macadam streets was used in this work.

STREET CONSTRUCTION.

MACADAM.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
*Amaron street—Tarine, Belmont avenue—Texas pen- etration,	White street to the X,	408	1,475	\$0 56	\$826 25
Charles street—Endurite,		3,634	19,434	97	18,791 99
Chestnut street—Endurite,		626	1,940	1 29	2,502 24
	Worthington to Bridge,	281	2,630	1 50	3,944 27
	Pearl street to Harrison avenue,	441			
Clarendon street—Trinidad,		140	1,204	87	1,048 89
Cornell street—Trinidad,		1,283	4,275	58	2,474 30
*Cumberland street—Tarine,	Main to North,	372	1,240	34	423 58
Dartmouth terrace—Trinidad,		488	2,544	53	1,358 10
*Donald street—Tarite,		444	1,480	70	1,038 83
Greene street,		1,347	4,490	48	2,171 12
†Locust street extension— Tarine,		2,495	7,882	1 96	15,080 15
Lowell street,		1,390	4,633	61	2,817 96
Mason street—Texas penetra- tion,		661	2,203	1 07	2,350 45

*Includes some old rock used from other streets.

†In addition to cost shown above, \$1,071 was charged Longhill street for hauling fillings from Locust street extension.

STREET CONSTRUCTION.**RECAPITULATION.**

	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost
Macadam, water-bound,	5,714	18,450	\$0 54	\$10,079 07
Macadam, completion of 1911 work,				86 50
Macadam, with Texas pen- etration,	4,295	21,637	98	21,142 44
Endurite,	3,687	11,849	1 33	15,780 90
Macadam, with Trinidad sur- face,	2,622	10,393	59	6,112 72
Macadam, with Tarine pen- etration,	5,786	18,766	1 15	21,637 94
Macadam, with Tarite pen- etration,	444	1,480	70	1,038 83
Macadam, with Bermudez penetration,	3,790	17,696	1 17	20,809 65
	<u>26,338</u>	<u>100,271</u>		<u>\$96,688 05</u>

STREET MAINTENANCE.
MACADAM RESURFACING.

Street.	Limits.	Material.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Buckingham place, Buckingham street,	State to Clarendon,	Trinidad asphalt,	275	916	\$0 054	\$49 12
North street, Pecousic avenue,	Liberty to Ferry, Longhill street to 1030 feet south of South end bridge,	Trinidad asphalt and Texas oil, Tarine, Texas penetration oil,	2,006 198	6,648 1,002	038 459	253 86 459 92
			2,694	8,708	76	6,631 32
			5,171	17,274		\$7,394 22

STREET CONSTRUCTION.**RECAPITULATION.**

	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Macadam, water-bound,	5,714	18,450	\$0 54	\$10,079 07
Macadam, completion of 1911 work,				86 50
Macadam, with Texas pen- etration,	4,295	21,637	98	21,142 44
Endurite,	3,687	11,849	1 33	15,780 90
Macadam, with Trinidad sur- face,	2,622	10,393	59	6,112 72
Macadam, with Tarine pen- etration,	5,786	18,766	1 15	21,637 94
Macadam, with Tarite pen- etration,	444	1,480	70	1,038 83
Macadam, with Bermudez penetration,	3,790	17,696	1 17	20,809 65
	26,338	100,271		\$96,688 05

STREET CONSTRUCTION.

PAVING.

Street.	Limits.	Material.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Belmont avenue,	At Fort Pleasant,	Mack blocks,		133	\$3 00	\$400 00
Chestnut street,	Bridge to Pearl,	Bitulithic,	201	952	2 50	2,380 68
East Court street,	Market to Dwight,	Wood blocks,	372	941	3 05	2,868 19
North Main street,	Grove to Thomas,	Wood blocks,	691	2,536	3 27	8,289 93
Sauford street,	Market to Dwight,	Wood blocks,	371	1,324	3 11	4,115 06
*South end bridge approach,						
State street,	Highland Div. N. Y., N. H. & H. Railroad to Amaron street,	Wood blocks,	180	434		
		Wood blocks,	1,106	4,271	3 14	13,404 78
Willow street,		Wood blocks,	1,189	3,443	3 11	10,696 38
			4,110	14,034		\$42,155 02

*Cost given in table of bridges.

MACADAM REPLACED BY PAVING.

		Length in feet.	Area in sq. yds.
Chestnut street,	Bridge street to Pearl,	201	952
East Court street,	Market street to Dwight,	369	855
North Main street,	Grove street to Thomas,	691	2,536
Sanford street,	Market street to Dwight,	367	1,278
State street,	Highland Div. N. Y. N. H. & H. R. R. to Amaron street,	1,106	4,271
Willow street,		895	2,493
		3,629	12,385

SIDEWALKS AND CURBING.

CONSTRUCTION AND RECONSTRUCTION.

By orders of the City Council.

Street.	Length in feet.	SIDEWALKS.		CURBING. Length in feet. 4" 6"	Order Approved.
		Material.	Description.		
Armory street,	3,585	Cement concrete,	New,	5,335	Dec. 12, 1911.
Belmont avenue,				2,772	May 28, 1912.
Benton street,					July 12, 1911.
Carew street,	356	Cement concrete,	New,		July 9, 1912.
Cumberland street,	146	Cement concrete,	New, with concrete curb,	384	June 6, 1911.
Eastern avenue,	433	Cement concrete,	New,		Nov. 29, 1911.
Eastern avenue,	493	Cement concrete,	New, with concrete curb,	631	June 6, 1911.
Pease street,	200	Cement concrete,	New,		Sept. 12, 1911.
Sumner avenue,				1,062	July 2, 1912.
Tenth street,	974	Brick,	Relaid,		Oct. 3, 1911.
Vermont street,				355	Oct. 24, 1911.
Washburn street,	339	Cement concrete,	New,	2,674	Oct. 2, 1908.
Wilbraham road,	914	Brick,	New,		July 13, 1911.
Worcester avenue,	564	Cement concrete,	New,	1,528	Oct. 3, 1911.
Worcester avenue,					Oct. 3, 1911.

MACADAM REPLACED BY PAVING.

		Length in feet.	Area in sq. yds.
Canter street.	Bridge street to Pearl.	201	952
East Court street.	Market street to Dwight.	369	855
North Main street.	Grove street to Thomas.	691	2,536
Sanford street.	Market street to Dwight.	367	1,278
State street.	Highland Div. N. Y. N. H. & H. R. R. to Amazez street.	1,106	4,271
Willow street.		895	2,493
		3,629	12,365

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year laid.
Barnes street,		Bitulithic,	178	552	1909
Belmont avenue,	At Locust and Mill streets,	Mack blocks,		133	1912
Belmont avenue,	Hall street westerly,	Catskill blocks,	1,362	1,211	1901
Belmont avenue,	Hall street to Oakland,	Metropolitan blocks,	1,023	914	1903
Birnie avenue,	Hooker street northerly,	Johi souburg blocks,	145	483	1906
Bridge street,	Main to Dwight,	Rock asphalt,	688	2,525	1900
Bridge street,	Dwight to Chestnut,	Creo-resinate wood bl'ks. 3" x 3½" x 8",	122	446	1910
		Asphalt blocks, 5" x 12" x 3",	195	712	1910
Bridge street,		Bitulithic,	493	1,746	1905
Bridge street,	Main street, 493 feet westerly, extension to Water street,	Bitulithic,	252	895	1911
Bridge street,	Water street to Old Toll bridge,	Granite blocks,	249	713	1907
Catharine street,	State to Bay,	Syracuse brick,	1,722	5,691	1900
Charles street,	Liberty to land of B. & A. R. R.,	Granite blocks,	150	376	1903
Chestnut street,	Pearl to Bridge,	Bitulithic,	201	952	1912
Chestnut street,	Worthington to Lyman,	Granite blocks,	472	1,673	1895
Chestnut street,	Lyman to B. & A. R. R.,	Granite blocks,	256	1,471	1889
Chestnut street,	B. & A. R. R. to Linden,	Granite blocks,	1,640	5,235	1892
Chestnut street,	Linden to Everett,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	419	1,438	1909

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year laid.
Main street,	Worthington to Hampden, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8",	---	662	1903
Main street,	Hampden to Lyman,	Creo-resinate wood bl'ks, 4" x 4" x 8",	158	775	1903
Main street,	Lyman to Liberty,	Creo-resinate grooved wood bl'ks, 4" x 4" x 8",	484	2,780	1903
Main street,	Liberty to Sharon, east side,	Creo-resinate wood bl'ks, 4" x 4" x 8",	453	1,185	1903
Main street,	Liberty to Sharon, west side,	Creo-resinate wood bl'ks, 8" x 3 1/2' x 6' to 10",	---	1,487	1907
Main street,	Sharon to near Franklin and Emery,	Creo-resinate wood bl'ks, 8" x 3 1/2' x 6" to 10",	509	3,108	1907
Main street,	near Franklin, east side,	Syracuse brick,	86	144	1907
Main street,	Franklin to Carew, east side,	Syracuse brick,	1,302	4,005	1897
Main street,	Emery to Sargeant, west side,	Catakill blocks,	1,447	5,449	1901
Main street,	crossing opposite Auburn street,	Catakill and Metropoli tan blocks,	---	168	1903
Maple street,	Central to High,	Bitulithic,	1,563	5,665	1904
Maple street,	High to State,	Bitulithic,	593	2,530	1905
Market street,	State to Harrison avenue,	Bitulithic,	968	1,887	1906
North Main street,	Plainfield to Morgan,	Bitulithic,	730	4,485	1906

TABLE OF PAVED STREETS.

Name.	Limits.	Material.	Length in feet.	Area in sq. yds.	Year laid.
Hampden street,	Main street westerly,	Bitulithic,	212	821	1904
Hampden street,	completion Main to Water,	Bitulithic,	394	1,539	1905
Harrison avenue,	Main to Dwight,	Trinidad asphalt,	586	2,247	1896
Hillman street,	Main to Dwight,	Bitulithic,	648	2,025	1906
King street,	St. Ry. turnout,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	317	1,023	1908
Liberty street,	Main street, easterly,	Bitulithic,	311	1,335	1911
Liberty street,	Chestnut to Cass,	Syracuse brick,	1,399	4,571	1900
Liberty street,	Cass to Heywood avenue,	Syracuse brick,	1,147	3,971	1901
Lyman street,	Main to Chestnut,	Granite blocks,	1,305	4,599	1889
Lyman street,	Chestnut street, easterly,	Granite blocks,	503	2,095	1908
Lyman street,	extension easterly to Spring st.,	Granite blocks,	228	949	1909
Main street,	Locust to Marble,	Syracuse brick,	840	4,381	1897
Main street,	Marble to William,	Syracuse brick,	1,762	8,307	1896
Main street,	William to Bliss,	Creo-resinate wood bl'ks, 3" x 3½" x 6" to 10",	1,150	6,460	1906
Main street,	Bliss to State,	Syracuse brick,	241	1,355	1893
Main street,	State to Worthington,	Creo-resinate wood bl'ks, 3" x 3½" x 8",	1,899	10,798	1904
Main street,	Worthington to Hampden, west side,	Creo-resinate wood bl'ks, 3" x 3½" x 8",	382	1,183	1904

STREET CONSTRUCTION.

MACADAM—CONTINUED.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
*Masasoit street—Tarine,	Prospect street to end of public street,	1,148	3,827	\$0 62	\$2,373 61
*Montrose street—Tarine,		978	3,242	63	2,042 47
Oak street—Endurite,		1,356	4,462	1 28	5,729 39
Orchard street,		1,040	3,467	57	1,962 63
Pearl street—Endurite,		983	2,817	1 28	3,605 00
Pineywoods avenue, comple- tion of 1911,					86 50
Princeton street—Trinidad,	St. James avenue to Cornell street,	267	890	51	450 12
Ridgewood place,		537	1,193	51	609 64
Sumner avenue — Bermudez penetration,	Sumner terrace to the X, north side, White street to the X,	1,700 2,090	4,236 13,460	1 17	20,809 65
*Walter street—Tarine,		390	1,300	69	891 88
Washburn street,		1,400	4,667	54	2,517 72
Wellesley street—Trinidad,		444	1,480	53	781 31
		26,398	100,271		\$96,688 05

*Includes some old rock used from other streets.

STREET MAINTENANCE.
MACADAM RESURFACING.

Street.	Limits.	Material.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Buckingham place, Buckingham street,	State to Clarendon,	Trinidad asphalt, Trinidad asphalt and Texas oil, Tarine,	275	916	\$0 054	\$49 12
North street, Pecousic avenue,	Liberty to Ferry, Longhill street to 1030 feet south of South end bridge,	Texas oil, Texas penetration oil,	2,006 196	6,648 1,002	038 459	253 86 459 92
			2,694	8,708	76	6,631 32
			5,171	17,274		\$7,394 22

STREET CONSTRUCTION.***GRADING AND GRAVELING.**

Street.	Length in feet.	Area in sq. yds.	Total Cost.
Kensington avenue, completion,			\$516 34
Knox street,	1,125	3,750	1,485 13
Lester street,	635	2,118	200 41
Maplewood terrace,			90 50
Riverview terrace,			440 02
Wilmont street, completion,			56 71
	1,760	5,868	\$2,789 11

*Old gravel taken from new macadam streets was used in this work.

STREET CONSTRUCTION.

MACADAM.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
*Amaron street—Tarine, Belmont avenue—Texas pen- etration, Charles street—Endurite, Chestnut street—Endurite,	White street to the X, Worthington to Bridge, Pearl street to Harrison avenue,	408 3,634 626 281 441 }	1,475 19,434 1,940 2,630	\$0 56 97 1 29 1 50	\$826 25 18,701 99 2,502 24 3,944 27
Clarendon street—Trinidad, Cornell street—Trinidad,		140 1,283	1,204 4,275	87 58	1,048 89 2,474 30
*Cumberland street—Tarine, Dartmouth terrace—Trinidad,	Main to North,	372 488	1,240 2,544	34 53	423 58 1,358 10
*Donald street—Tarite, Greene street, †Locust street extension— Tarine, Lowell street, Mason street—Texas penetra- tion,		444 1,347 2,495 1,390 661	1,480 4,490 7,682 4,633 2,203	70 48 1 96 61 1 07	1,038 83 2,171 12 15,080 15 2,817 96 2,350 45

*Includes some old rock used from other streets.

†In addition to cost shown above, \$1,071 was charged Longhill street for hauling fillings from Locust street extension.

STREET CONSTRUCTION.

MACADAM—CONTINUED.

Street.	Limits.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
*Massasoit street—Tarine,	Prospect street to end of public street,	1,148	3,827	\$0 62	\$2,373 61
*Montrose street—Tarine,		973	3,242	63	2,042 47
Oak street—Endurite,		1,356	4,462	1 28	5,729 39
Orchard street,		1,040	3,467	57	1,962 63
Pearl street—Endurite,		983	2,817	1 28	3,605 00
Pineywoods avenue, comple- tion of 1911,					
Princeton street—Trinidad,	St. James avenue to Cornell street,	267	890	51	86 50
Ridgewood place,		537	1,193	51	450 12
Sumner avenue — Bermudez	Sumner terrace to the X, north side,	1,700	4,236		809 64
penetration,	White street to the X,	2,090	13,460	1 17	20,809 85
*Walter street—Tarine,		390	1,300	69	
Washburn street,		1,400	4,667	54	891 88
Wellesley street—Trinidad,		444	1,480	53	2,517 72
					781 31
		26,338	100,271		\$96,688 05

*Includes some old rock used from other streets.

STREET MAINTENANCE.

MACADAM RESURFACING.

Street.	Limits.	Material.	Length in feet.	Area in sq. yds.	Cost per sq. yd.	Total Cost.
Buckingham place, Buckingham street,	State to Clarendon,	Trinidad asphalt, Trinidad asphalt and Texas oil, Tarine,	275	916	\$0 054	\$49 12
North street, Pecousic avenue,	Liberty to Ferry, Longhill street to 1030 feet south of South end bridge,	Texas oil, Texas penetration oil,	2,006 196 2,694	6,648 1,002 8,708	038 459 76	253 86 459 92 6,631 32
			5,171	17,274		\$7,394 22

SEWER CONSTRUCTION—1912.

STREET.	LIMITS.	VITRIFIED CLAY PIPE.					Total Length.	Total Cost of Sewer.	Total Cost per Lineal Ft.	Average Depth of Cutting.	Width of Trench.	Material Excavated.
		24"	20"	18"	15"	12"						
Albemarle ave.	Wilbraham road, southerly		300	314	421		1035	\$971.81	\$0.94	8.6	4.0	Sand and gravel
Atwater terrace.	Springfield st., northerly		1020				1020	1448.06	1.42	8.5	4.0	Clay and sand
Belvidere ave.	Belmont ave., southerly		300	201			501	824.37	1.65	12.5	4.0	Sand
Biltmore st.	Dickinson st. to Trafton road.						1060	866.51	.82	9.0	3.5	Sand
Birnie ave. ext.	Arch st., southerly		300	349	445		1094			6.4	3.5	Blue clay
Blaine st.	White to Greenbrier st.	118					118	268.98	2.27	12.5	4.0	Sand
Chilton st.	Sumner ave., southerly						228	153.57	.68	10.0	3.5	Sand
Crane st.	Franklin st., northerly						299	331.87	1.11	7.3	4.0	Sand, hard clay
Daviston ave.	Allen st. to West Alford ave.						403		.72	8.3	3.5	Sand
Daviston ave.	East Alford to East Alford ave.						400	796.55		7.9	3.5	Sand
Daviston ave.	East Alford ave., southeasterly						299	604.37	1.21	9.8	3.5	Sand
Dunmoreland ave.	Wilbraham road, southerly						1093	956.64	.88	8.9	3.5	Sand
East Alford ave.	West Alford to Daviston ave.						1093	436.66	1.33	11.0	3.5	Sand
Eddywood ave.	Sumner ave., northerly		301	200			501			8.0	3.5	Sand and clay
Franklin st.	Webster st. to Murray Hill ave., extension.		495				328			4.7	4.0	Sand and clay
Goodrich st.	Liberty st., northerly						260	342.29	1.32	8.0	3.5	Sand and clay
Greenbrier st.	Larkspur to Trillium st.						240	460.87	1.92	4.7	4.0	Sand
Greenbrier st.	Blaineto Trillium st.						300		.51	7.2	3.5	Sand
Knox st.	Smith to Windsor st.						270	291.24		9.3	3.5	Sand
Larkspur st.	White st., easterly						896		2.30	8.0	4.3	Clay and sandy loam
Lowell st.	At Connecticut river		299	304	101		704	1,988.46	.69	7.5	4.0	Sand
Maple dell st.	Extension northerly to Burr st.						70	77.03	1.10		3.0	Sand and marl
Marthoro ave.	State st. to Wilbraham road.						42	62.54	1.49	4.5	3.0	Sand
Marthoro ave.	Plainfield st. to Connecticut river						749	537.09	.72	7.0	3.8	Sand
Mo re ave.	Extensions northerly and southerly						435	580.07	.79	8.5	4.0	Sand and marl
Oak Grove ave.	Extensions northerly and southerly						404	183.92	.45	4.5	3.0	Sand and gravel
Oak Grove ave.	Garden Brook sewer to North st.						880	2,055.99	3.17	10.8	4.3	Clay and filling
Osgood st.	St. James ave., northerly	340	340				3252	9,894.55	3.06	14.0	4.5	Gravel, sand, and clay
Page blvd.	Sanderson terrace, southerly, extension						359	883.79	2.46	11.6	4.3	Fine sand and clay
Plainfield st.	Johnson st., northerly						565	426.13	.75	6.0	3.3	Sand
Ranney st.	Wilmont st., southerly						264		1.13	6.9	3.5	Sand
Ranney st.	Garden Brook sewer, easterly						85	96.04		9.0	4.0	Sand and clay
Sharon st.	Garden Brook sewer to Main st.						1064	2,365.50	2.21	10.0	4.0	Sand and clay
St. James ave.	Chicopee road to Page boulevard						331	853.30	2.67	10.0	4.0	Sand and clay
Sylvan ave.	Belmont ave. to Fountain place	127					127	396.62	3.12	14.4	4.5	Sand and gravel
Trafton road.	Dickinson st., westerly		294	251	249		794	1,136.42	1.43	11.2	4.0	Sand
Trafton road.			351	400	140		961	923.08	.97	6.2	3.5	Sand

SEWER CONSTRUCTION—1912.—CONTINUED.

STREET.	LIMITS.	VITRIFIED CLAY PIPE.						Total Cost of Sewer.	Total Cost per lineal ft.	Average Depth of Cutting.	Width of Trench.	Material Excavated.
		Size in Inches.										
		24"	30"	18"	15"	12"	10"					
Trillium st.....	White to Greenbrier st.....		345					\$216.74	\$0.43	8.5	3.5	Sand
Trinity terrace.....	Summer ave. to Morningside Park...		300	416				716		8.2	3.5	Sand and clay
Virginia st.....	Dickinson st. to Trafton road.....		348	301	344			183.42	.74	8.0	4.0	Sand
Walnut court.....	Walnut st., westerly.....			211				188.15	.89	4.1	3.8	Sand and loam
West Alford ave.....	Summer to Daviston ave.....	153	268	550				1,546.17	.91	8.1	4.1	Sand
White st.....	Longfellow terrace to Trillium st.....		166					561.74	1.18	8.5	8.5	Sand
White st.....	Belmont ave. to Trillium st.....	233		320				1,008.39	1.59	11.0	3.7	Sand
Whiting st.....	Plainfield st., westerly.....		182	191	210			238.85	1.31	9.3	3.1	Sand and clay
Wright place.....	Water st., easterly, extension.....				175			240.47	1.37	6.5	3.5	Sandy loam
Total		5220	1503	3516	3226	4791	7723	25,979	\$37,005.60			

*Completed.
**Incomplete.
+Reh'd.

‡Does not include cost of connections to buildings or street inlets.
i 79' of 3' underdrain.
* 182' of 3' underdrain.
* 88' of 4' underdrain.
* 240' of 4' underdrain.
* 854' of 4' underdrain.
* 310' of 4' underdrain.
370' of 6' underdrain.
* 322' of 6' underdrain.
* 348' of 4' underdrain.
* 450' of 6' underdrain.
614' of 4' underdrain.
11 186' of 4' underdrain.
11 71' of 6' underdrain.
136' of 6' underdrain.

*Completed.

**Incomplete.

+Relaid.

‡Does not include cost of connections to buildings or street inlets.

1 79' of 3" underdrain.
 * 182' of 3" underdrain.
 * 88' of 4" underdrain.
 * 240' of 4" underdrain.
 * 854' of 4" underdrain.
 * 310' of 4" underdrain.
 370' of 6" underdrain.
 * 3222' of 6" underdrain.
 * 348' of 4" underdrain.
 * 450' of 6" underdrain.
 614' of 4" underdrain.
 * 159' of 4" underdrain.
 * 74' of 6" underdrain.
 136' of 8" underdrain.

*COST OF SEWER SYSTEM TO DECEMBER 1, 1912.

YEARS.	CONSTRUCTION.	MAINTENANCE.	TOTAL.
1863-1880 inclusive	\$357,163 72	\$38,178 38	\$395,342 10
1881	43,902 05	2,359 29	46,261 34
1882	28,391 33	3,039 25	31,430 58
1883	26,573 85	4,039 33	30,613 18
1884	36,035 22	2,929 25	38,964 47
1885	29,199 74	2,477 23	31,676 97
1886	25,313 73	2,541 81	27,855 54
1887	33,967 31	2,376 47	36,343 78
1888	30,872 07	3,951 21	34,823 28
1889	24,123 28	6,056 46	30,179 74
1890	22,143 10	10,004 42	32,147 52
1891	86,586 55	6,412 75	92,999 30
1892	65,694 01	6,823 51	72,517 52
1893	27,881 38	8,553 66	36,435 04
1894	27,857 15	7,236 53	35,093 68
1895	23,905 82	7,598 31	31,504 13
1896	45,299 89	8,634 30	53,934 19
1897	33,976 14	8,790 00	42,766 14
1898	47,751 26	6,986 99	54,738 25
1899	51,246 07	8,594 56	59,840 63
1900	140,380 89	9,862 21	150,243 10
1901	80,276 02	13,272 25	93,548 27
1902	38,904 19	12,909 40	51,813 59
1903	29,169 75	9,034 88	38,204 63
1904	46,339 05	12,916 69	59,255 74
1905	40,831 47	9,620 62	50,452 09
1906	24,419 73	12,444 00	36,863 73
1907	47,977 73	10,797 97	58,775 70
1908	62,949 97	10,468 88	73,418 85
1909	39,013 60	11,002 42	50,016 02
1910	43,909 33	13,196 60	57,105 93
1911	34,186 56	12,836 07	47,022 63
1912	40,397 52	12,412 39	52,809 91
	\$1,736,639 48	\$298,358 09	\$2,034,997 57

*Does not include cost of connections to buildings or street inlets.

*PRECIPITATION FOR CALENDAR YEAR—1912.

Month.	Total in Inches.	Greatest Amt. in 24 Hours.	Dates.	Portion of Storms in which the Precipitation exceeded Half Inch per Hour.	Max. Rate per Hour— Inches.	Duration of Max. Rate— Minutes.
Jan.	.95	.32	29	April 2, .21 inch in 15 min.	.84	15
Feb.	2.80	1.55	21-22	" 7, .30 " " 24 "	.75	24
March	5.48	1.69	12-13	" 16, .51 " " 80 "	1.02	30
April	4.59	1.04	2	" 27, .15 " " 12 "	.75	12
May	4.40	1.28	16-17	May 12, .08 " " 10 "	.60	10
June	.39	.32	6	" 16, .19 " " 15 "	.76	15
July	1.89	.88	21	" 24, .18 " " 10 "	1.08	10
Aug.	3.76	1.43	18	" 24, .77 " " 23 "	2.00	23
Sept.	2.33	1.20	1-2	Sept. 6, .30 " " 10 "	1.80	10
Oct.	2.56	2.12	23-24	" 16, .20 " " 20 "	.60	20
Nov.	3.78	1.96	7-8	Oct. 23, .68 " " 80 "	.51	80
Dec.	3.51	1.00	27	" 24, .40 " " 25 "	.96	25
Total	36.44					

*Includes rain, melted hail, sleet and snow.

Number of days in which precipitation exceeded .01 inch,		98
Number of days during which snow and sleet fell, .		25
Date of last snowfall in spring,	Apr. 9	
Date of first snowfall in fall,	Nov. 25	
Highest water in Connecticut river and date,	Apr. 9,	16.1'
Lowest water in Connecticut river and date,	July 8,	3.6'
Annual range of Connecticut river,		12.5'
Mean daily height of Connecticut river,		6.18'
Greatest 24-hour rise and date,	Oct. 24-25,	4.8'
Greatest 24-hour fall and date,	Apr. 10-11,	2.2'

Rainfall since 1891 amounting to 7 Inches or more per Month.			Rainfall since 1891 amounting to 4 Inches or more in 24 Hours.		
July, 1897,	14.68 inches.		July 18, 1897,	5.08 inches.	
June, 1903,	8.33 "		Aug. 1-2, 1904,	4.04 "	
Aug., 1904,	7.22 "		Sept. 14-15, 1904,	4.00 "	
Sept., 1907,	8.27 "		Apr. 14-15, 1909,	4.03 "	
Aug., 1908,	6.99 "		Oct. 18-19, 1911,	5.80 "	
Oct., 1911,	8.66 "				

PRECIPITATION—1892-1912.

YEAR.	TOTAL IN INCHES.	YEAR.	TOTAL IN INCHES.
1892.....	37.70	1902.....	46.74
1893.....	39.72	1903.....	45.91
1894.....	27.43	1904.....	39.12
1895.....	36.66	1905.....	32.83
1896.....	36.33	1906.....	42.37
1897.....	53.25	1907.....	44.11
1898.....	49.18	1908.....	36.06
1899.....	34.78	1909.....	34.96
1900.....	43.62	1910.....	32.18
1901.....	52.34	1911.....	41.84
		1912.....	36.44
		Total.....	841.61

40.08 yearly average for 21 years.

GENERAL STATISTICS.

CITY OF SPRINGFIELD, MASS., DECEMBER 1, 1912.

Springfield is situated on the east bank of the Connecticut river, in latitude 42° 06' north, longitude 72° 35' west, at an elevation above sea level of from 65 to over 215 feet.

Zero of "City Base" is 27.1 feet below sea level.

State street, at corner of Main street, is 65.9 feet above sea level, or 93 feet "City Base."

State street, at corner of Walnut street, is 199.1 feet above sea level.

Sumner ave. at corner of Belmont ave. is 187.9 feet above sea level.

Highest elevation in city (Markham Hill) 320 feet above sea level.

Greatest extent of city, north and south, 5.9 miles

Greatest extent of city, east and west, 8.9 miles

Connecticut river frontage, 4.65 miles

Area, including those portions covered by water, approximately, 24,661 acres 38.533 sq. miles

Area by wards: Ward One, 1,733.6 acres; Two, 225.7 acres; Three, 234.8 acres; Four, 413.2 acres; Five, 400.6 acres; Six, 327.4 acres; Seven, 2,197.7 acres; Eight, 19,128.3 acres. Area taxed, 16,185 acres.

Total park areas, 589.84 acres; Forest Park, 476.10 acres.

Population, estimated April 1, 1912, 94,100

Number of voters: men, 16,189; women, 353; total, 16,542

Number of polls, April 1, 1912, 26,648

School enrollment:	{	public, day,	16,584	{	19,461	{	21,861
		public, night,	2,877				
		parochial,	2,400				

Valuation,	{	Real estate,	\$123,614,170	{	\$151,971,730
		April 1, 1912, { Personal,	28,357,560		

Tax rate, \$15.50 per \$1,000.

		Square yards.	Miles.
Public streets accepted to Dec. 1, 1912, 163.029 miles.	{ Wood block,	72,128	2.994
	{ Granite block,	36,716	2.140
	{ *Syracuse brick,	77,920	3.700
	{ Other brick pavers,	8,353	.753
	{ Sheet asphalt,	7,877	.444
	{ Asphalt blocks,	712	.037
	{ Bitulithic,	54,369	2.917
	{ †Macadam, Water bound,	1,313,536	72.730
	{ Macadam, Bituminous,	91,955	4.652
	{ Gravel or dirt,		72.662
			163.029

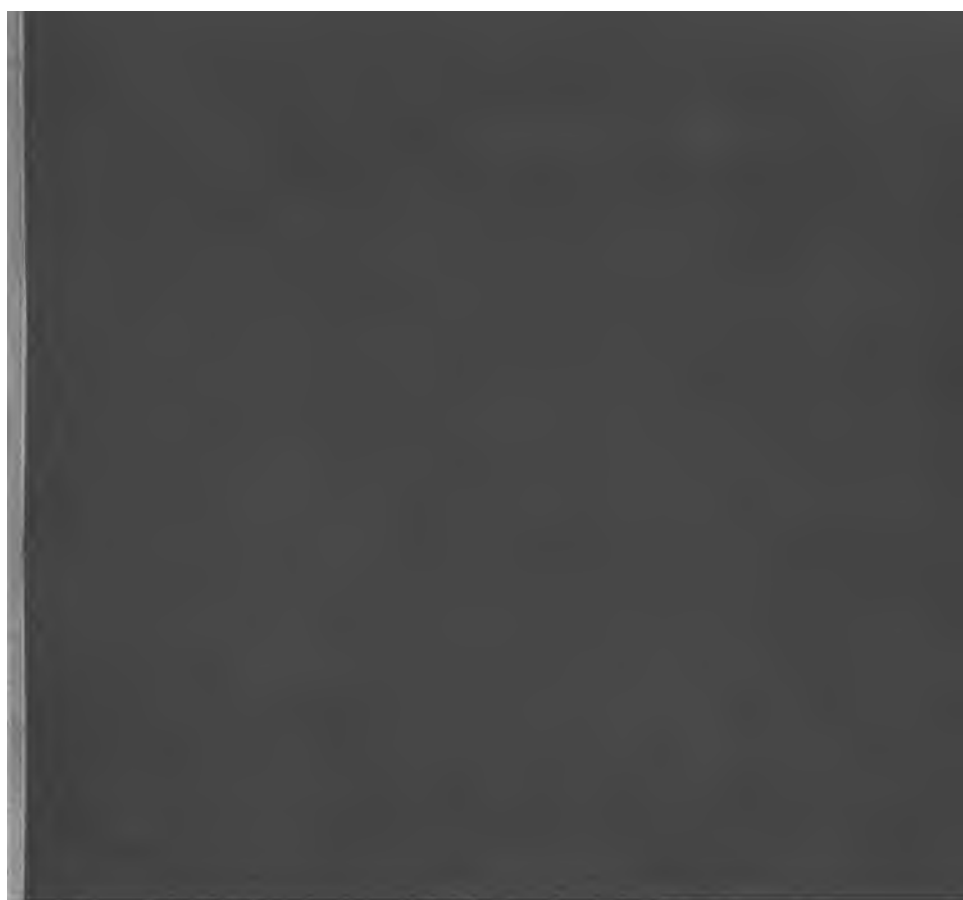
*Does not include brick pavement in railway tracks around Court Square.

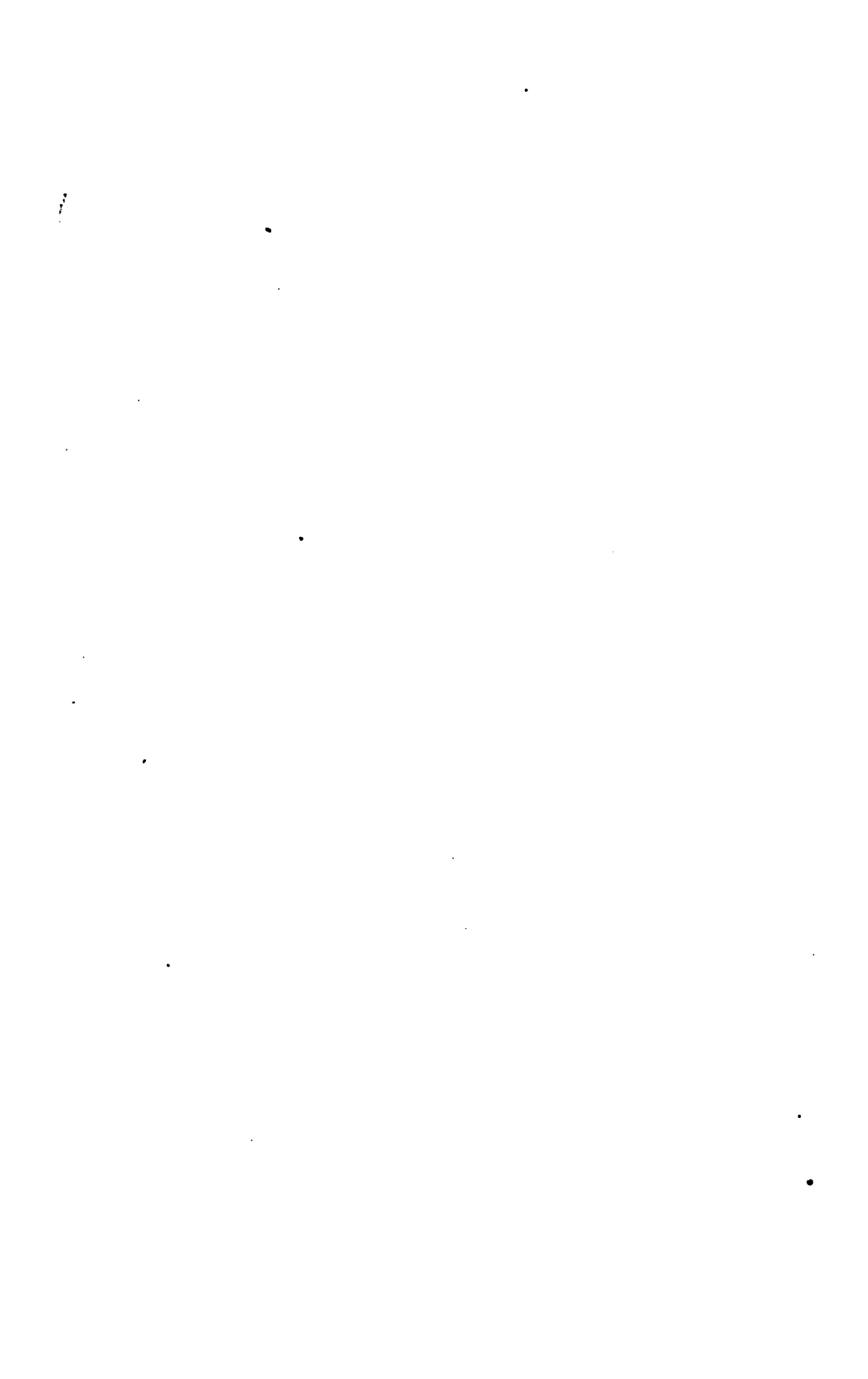
† Includes Pecousic avenue and Longmeadow street through Forest Park under the care of the Park Department.

Sidewalks laid in public streets to Dec. 1, 1912, about 177.6 miles.

Electric railways, Dec. 1, 1912 (double track counted twice),

In public streets,	.	.	.	.	54.962 miles
On private property,	.	.	.	.	4.379 miles
					59.341 miles
Steam railroads,	.	.	.	{ Four tracks, about	4.5 miles
				{ Double tracks, about	7. miles
				{ Single track, about	13.2 miles
Water mains,	.	.	.	.	195.11 miles
Gas mains, July 1, 1912,	.	.	.	.	146.58 miles
				{ Brick sewers,	26.024 miles
				{ Vitrified clay pipe,	76.595 miles
				{ Cement pipe,	22.26 miles
Sewers, 129.213 miles,	.	.	.	{ Wood pipe,	.193 miles
				{ Cast iron,	.028 miles
				{ Concrete,	3.988 miles
				{ Brick-concrete,	.125 miles
Street lights, arc,	1,309			Post offices,	4
Street lights, incandescent,	388			Post office sub-stations,	19
Dwelling houses,	14,857			Police stations,	2
Schoolhouses,	37			Railroad stations,	6
Churches,	64			Engine houses,	13
Fire apparatus: motor driven,				Fire apparatus: horse drawn,	
Hose and chemical wagons,	9			Steam fire engines,	6
Aerial trucks,	3			" " " reserve,	2
Water towers,	1			Hose wagons,	5
Trolley transportation car,	1			Ladder trucks,	5
Commercial truck,	1			Aerial truck,	1
Auxiliary squad automobiles,	2				
Spare auxiliary automobile,	1				
Automobiles for Chief, Assistants, and Supt. Fire Alarm,	5				





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2



B'D. OCT 27 1913

